Itron, Inc.

TEST REPORT FOR

CGR ACT Module 3 (CAM3)
Model: OW3

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.247
(FHSS 902-928 MHz)

Report No.: 101674-1

Date of issue: October 11, 2018

This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

Test Certificate # 803.05

Testing the Future
CKC LABORATORIES, INC.

TABLE OF CONTENTS

ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Itron, Inc.
2111 N. Molter Road
Liberty Lake, WA 99019

Representative: Jay Holcomb
Customer Reference Number: 159196

REPORT PREPARED BY:

Terri Rayle
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 101674

DATE OF EQUIPMENT RECEIPT: August 20, 2018
DATE(S) OF TESTING: August 20-29, 2018

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the equipment provided by the client, tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.

Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information

Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
22116 23rd Drive S.E., Suite A
Canyon Park, Bothell, WA 98021

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.11

Site Registration & Accreditation Information

Location	NIST CB #	TAIWAN	CANADA	FCC	JAPAN
Canyon Park Bothell, WA	US0081	SL2-IN-E-1145R	3082C-1	US1022	A-0148

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C - 15.247 (FHSS 902-928MHz)

Test Procedure	Description	Modifications	Results
15.247(a)(1)(i)	Occupied Bandwidth	NA	Pass
15.247(a)(1)	Carrier Separation	NA	Pass
15.247(a)(1)(i)	Number of Hopping Channels	NA	Pass
15.247(a)(1)(i)	Average Time of Occupancy	NA	NP
15.247(b)(2)	Output Power	NA	Pass
15.247(d)	RF Conducted Emissions & Band Edge	NA	Pass
15.247(d)	Radiated Emissions & Band Edge	NA	Pass
15.247(f)	Hybrid Systems	NA	Pass
15.247(f)	Average Time of Occupancy	NA	NP
15.247(f)	Power Spectral Density	NA	Pass
15.207	AC Conducted Emissions	NA	Pass

NA = Not Applicable
NP = CKC Laboratories was not contracted to perform test: See Manufacturer's Declaration in Test Section.

ISO/IEC 17025 Decision Rule
The declaration of pass or fail herein is based upon assessment to the specification(s) listed above, including where applicable, assessment of measurement uncertainties. For performance related tests, equipment was monitored for specified criteria identified in that section of testing.

Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions
No modifications were made during testing.

Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions
There are 4 physical configurations tested, and 12 different modulations investigated.

EQUIPMENT UNDER TEST (EUT)

During testing, numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 1

Equipment Tested:

Device	Manufacturer	Model #	S/N
CGR ACT Module 3 (CAM3)	Itron, Inc.	OW3	FCC-1 (CGR), CAM3-FCC1 (CAM Module, ID)

Support Equipment:

Device	Manufacturer	Model #	S/N
Connected Grid Router (Host	Cisco Systems, Inc.	CGR 1240	FTX2204G01J
Laptop	Dell	E6420	NA
AC Adapter (for Laptop)	Dell	DA130PE1-00	NA
USB to Ethernet adapter	Linksys	USB3GIGV1	NA

Configuration 2

Equipment Tested:

Device	Manufacturer	Model #	S/N
CGR ACT Module 3 (CAM3)	Itron, Inc.	OW3	FCC-1 (CGR), CAM3-FCC1 (CAM Module, ID)

Support Equipment:

Device	Manufacturer	Model #	S/N
2.8dBi Colinear Omni Antenna (attached)	Cisco Systems, Inc.	07-1140-02	NA
Connected Grid Router (Host	Cisco Systems, Inc.	CGR 1240	FTX2204G01J
Laptop	Dell	E6420	NA
AC Adapter (for Laptop)	Dell	DA130PE1-00	NA
USB to Ethernet adapter	Linksys	USB3GIGV1	NA

Configuration 3

Equipment Tested:

Device	Manufacturer	Model #	S/N
CGR ACT Module 3 (CAM3)	Itron, Inc.	OW3	FCC-1 (CGR) CAM3-FCC1 (CAM Module, ID)

Support Equipment:

Device	Manufacturer	Model #	S/N
5.5dBi Colinear Omni Antenna (remote)	Cisco Systems, Inc.	ANT-WPAN-OM-OUT-N	NA
Connected Grid Router (Host	Cisco Systems, Inc.	CGR 1240	FTX2204G01J
Laptop	Dell	E6420	NA
AC Adapter (for Laptop)	Dell	DA130PE1-00	NA
USB to Ethernet adapter	Linksys	USB3GIGV1	NA

Configuration 4

Equipment Tested:

Device	Manufacturer	Model #	S/N
CGR ACT Module 3 (CAM3)	Itron, Inc.	OW3	FCC-1 (CGR) CAM3-FCC1 (CAM Module, ID)

Support Equipment:

Device	Manufacturer	Model #	S/N
8.15dBi Colinear Omni Antenna (remote)	Antenex	FG9026	NA
Connected Grid Router (Host	Cisco Systems, Inc.	CGR 1240	FTX2204G01J
Laptop	Dell	E6420	NA
AC Adapter (for Laptop)	Dell	DA130PE1-00	NA
USB to Ethernet adapter	Linksys	USB3GIGV1	NA
3dB Attenuator (for 8.15dBi antenna)	Mini-Circuits	BW-N3W5+	NA

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Limited Modular, Cisco CGR Host
Type of Wideband System:	Proprietary FHSS
Operating Frequency Range:	902.2 to 927.75MHz (GFSK) (10k) 902.4 to 927.6MHz (GFSK, OQPSK, OFDM) 902.8 – 926.8MHz (OFDM) (1.2M)(Hybrid)
Number of Hopping Channels:	512 – 50kHz steps (902.2 to 927.75MHz) 64 - 400kHz steps (902.4 to 927.6MHz) 31 – 800kHz steps (902.8 to 926.8 MHz) (Hybrid)
Modulation Type(s):	10k, 50k, 150kbps GFSK, 6.25k, 12.5kbps OQPSK, 200k, 600k OFDM 1.2M OFDM (Hybrid)
Maximum Duty Cycle:	100%
Number of TX Chains:	1
Antenna Type(s) and Gain:	colinear omni 2.8dBi colinear omni 5.5dBi colinear omni 8.15dBi
Beamforming Type:	NA
Antenna Connection Type:	External Connector (Professional Installation)
Nominal Input Voltage:	100-240VAC
Firmware / Software used for Test:	Firmware: CAM3-DEV Major Number 4, Minor Number 7, Build Number 153, Revision Number 787268 Test Software: CAM3 FCC Test Helper v14

FCC Part 15 Subpart C

15.247(a) Transmitter Characteristics

Test Setup/Conditions			
Test Location:	Bothell Lab Bench	Test Engineer:	M. Atkinson
Test Method:	ANSI C63.10 (2013)	Test Date(s):	8/20/18 to 8/21/18
Configuration:	1		
Test Setup:	Firmware power setting: Max Firmware: CAM3-DEV Major Number 4, Minor Number 7, Build Number 153, Revision Number 787268 Test Software: CAM3 FCC Test Helper v14 Duty Cycle: Tested at 100% Setup: The EUT is continuously transmitting with modulation on ISM port. The EUT ISM port is connected directly to a spectrum analyzer for direct conducted measurements. Low, Mid, High channels investigated, all modulation types investigated.		

Environmental Conditions			
Temperature (ºC)	22-24	Relative Humidity (%):	38-42

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
02673	Spectrum Analyzer	Agilent	E4446A	2/3/2017	2/3/2019
P07228	Attenuator	Pasternack	PE7004-20	11/30/2017	11/30/2019
P07226	Attenuator	Pasternack	PE7004-6	12/1/2017	12/1/2019
P06008	Cable	Andrew	Heliax	4/10/2018	4/10/2020

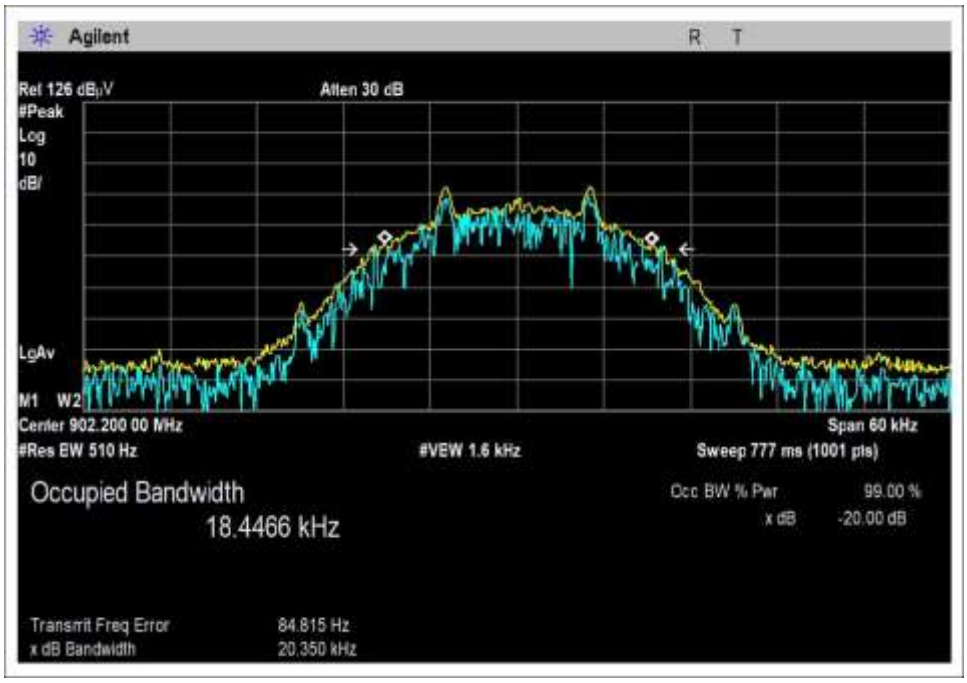
15.247(a)(1) 20 dB Bandwidth

Test Data Summary					
Frequency (MHz)	**Antenna Port**	**Modulation**	**Measured (kHz)**	**Limit (kHz)**	**Results**
902.2	1	10k GFSK	20.35	≤500	Pass
915.0	1	10k GFSK	19.52		
927.75	1	10k GFSK	20.05		
902.4	1	50k GFSK	101.90	≤500	Pass
915.2	1	50k GFSK	101.32		
927.6	1	50k GFSK	102.02		
902.4	1	150k GFSK	182.35	≤500	Pass
915.2	1	150k GFSK	180.73		
927.6	1	150k GFSK	181.72		
902.4	1	6.25k OQPSK	133.76	≤500	Pass
915.2	1	6.25k OQPSK	133.07		
927.6	1	6.25k OQPSK	133.79		
902.4	1	12.5k OQPSK	132.90	≤500	Pass
915.2	1	12.5k OQPSK	131.02		
927.6	1	12.5k OQPSK	130.97		
902.4	1	200k OFDM	333.63	≤500	Pass
915.2	1	200k OFDM	334.71		
927.6	1	200k OFDM	335.18		
902.4	1	600k OFDM	331.95	≤500	Pass
915.2	1	600k OFDM	332.68		
927.6	1	600k OFDM	332.79		
902.8	1	1.2M OFDM (Hybrid)	572.59	*See Note	Pass
914.8	1	1.2M OFDM (Hybrid)	577.51		
926.8	1	1.2M OFDM (Hybrid)	577.22		

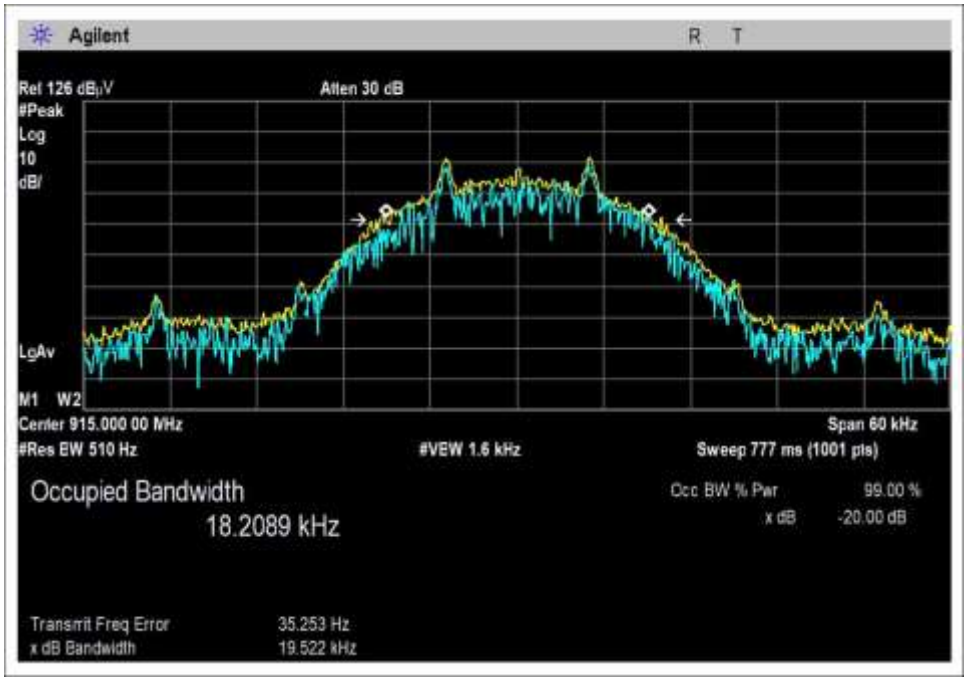
*This mode a Hybrid mode and is not required to meet the FHSS bandwidth limit. However, the system must pass the DTS PSD limit of 8dBm in any 3kHz band. DTS bandwidth was measured for informational purposes.
See Supplemental Section of data in 15.247 (f) Hybrid Systems.

Plots

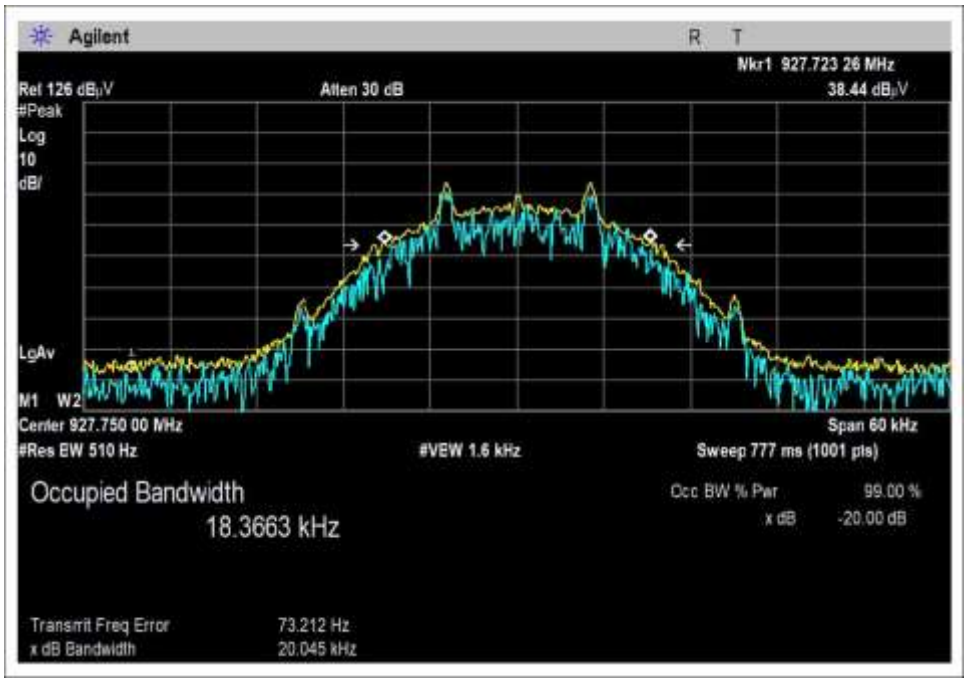
GFSK



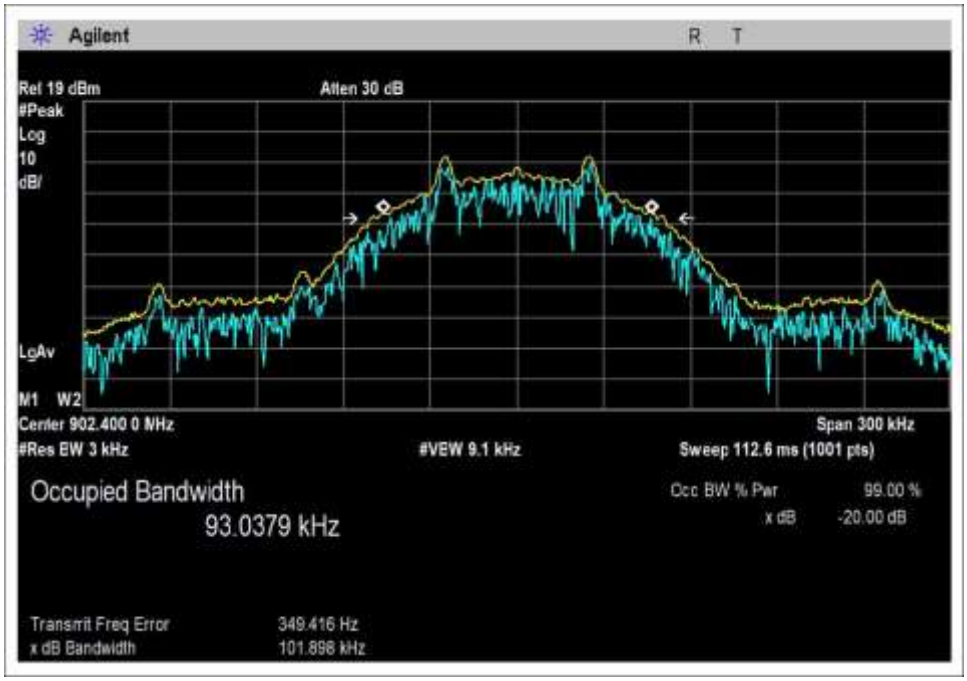
Low Channel, 10k



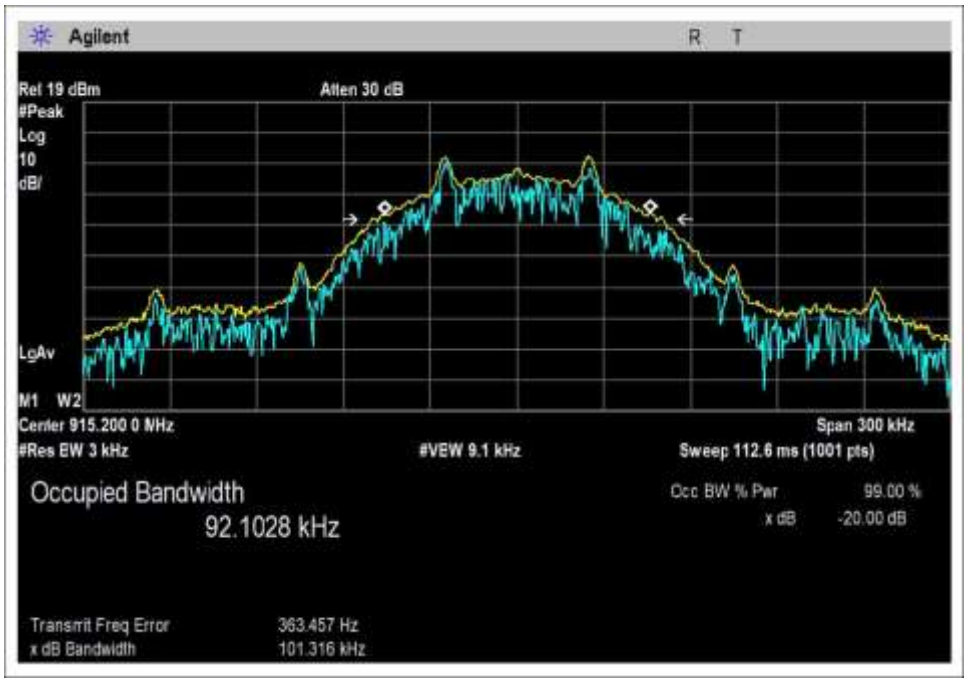
Middle Channel, 10k



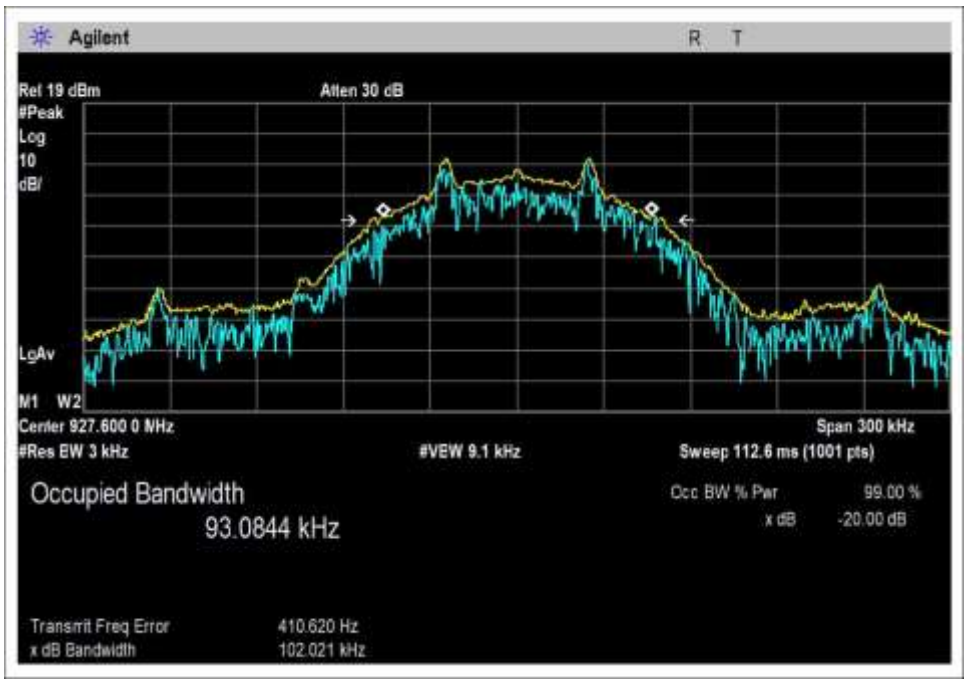
High Channel, 10k



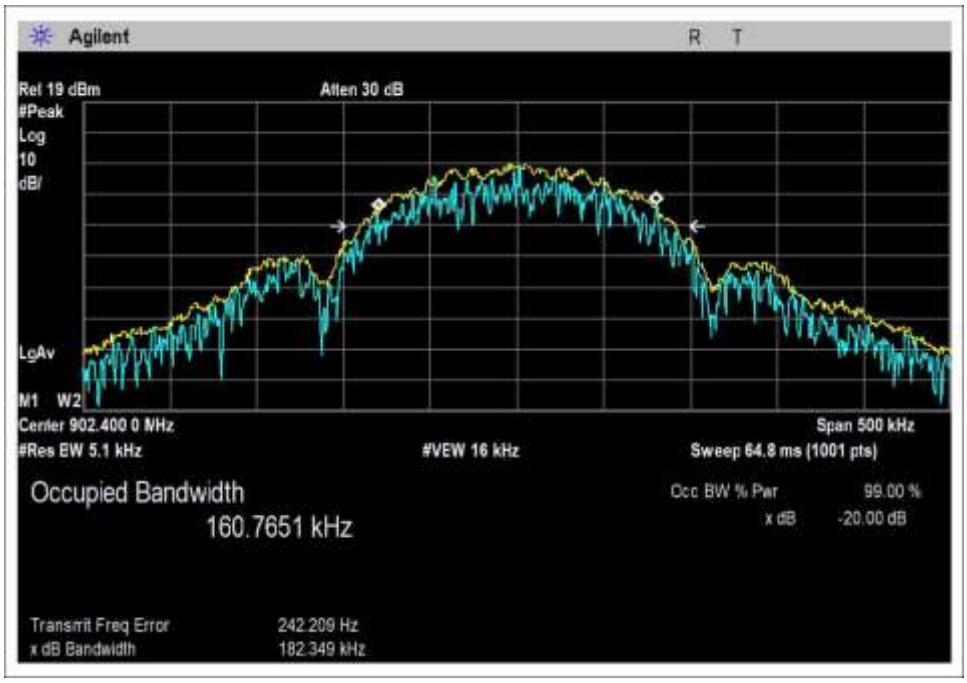
Low Channel, 50k



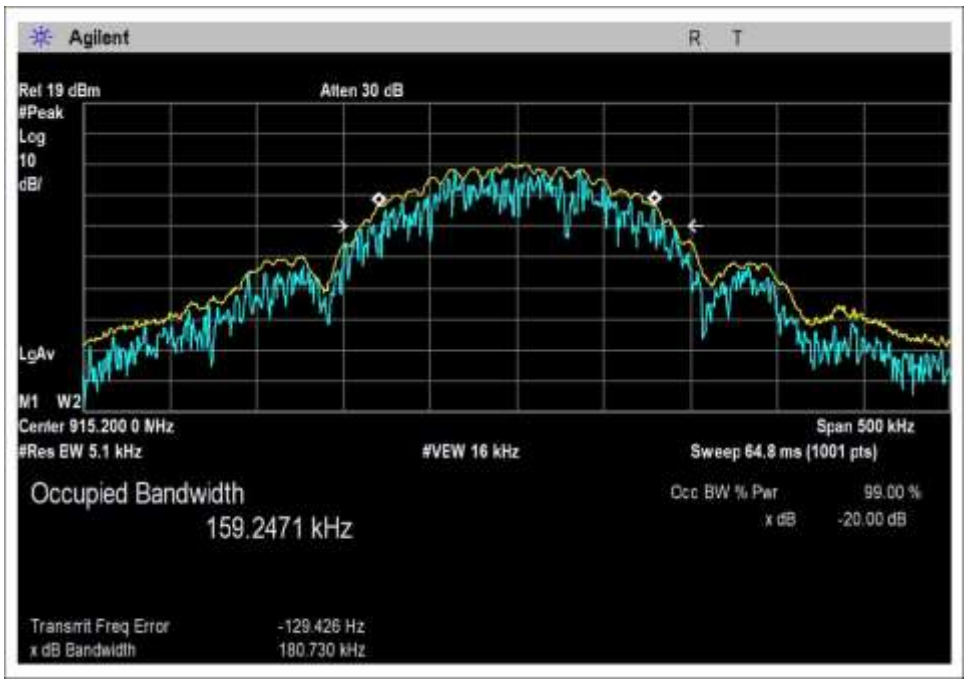
Middle Channel, 50k



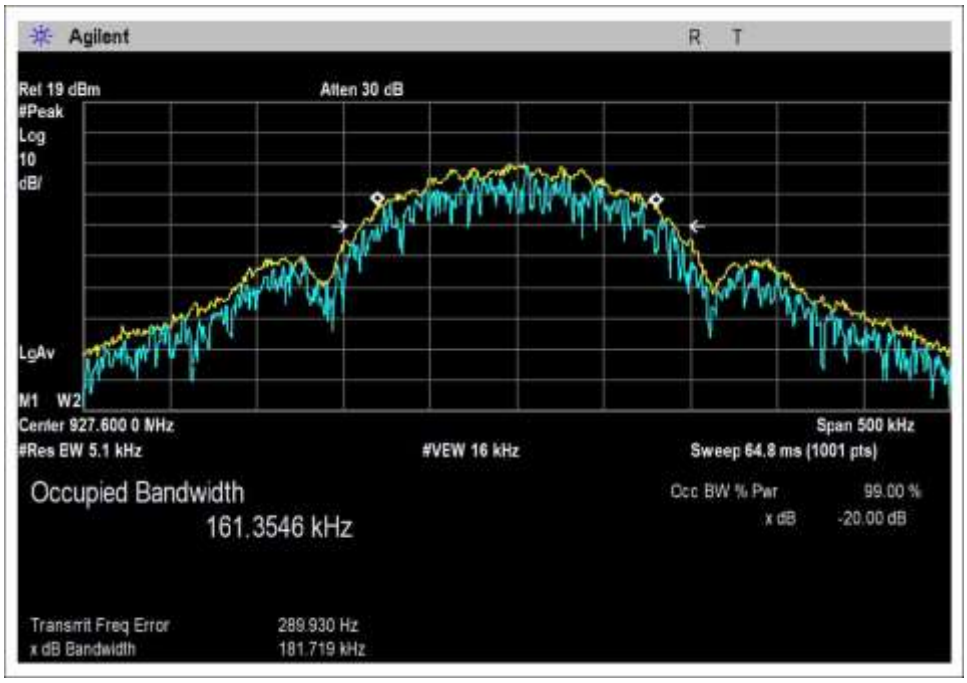
High Channel, 50k



Low Channel, 150k

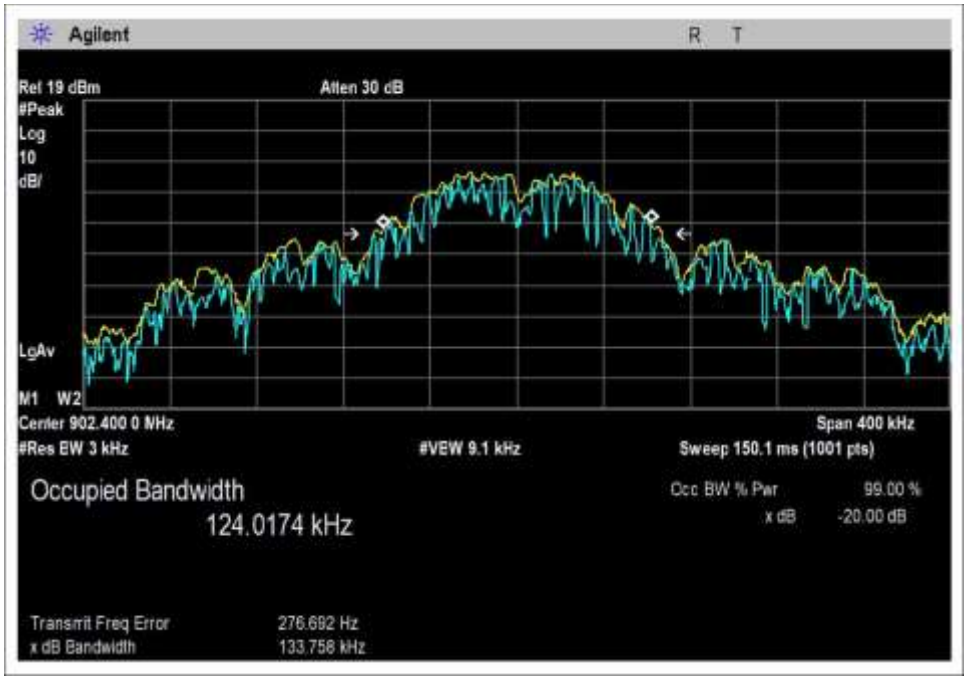


Middle Channel, 150k

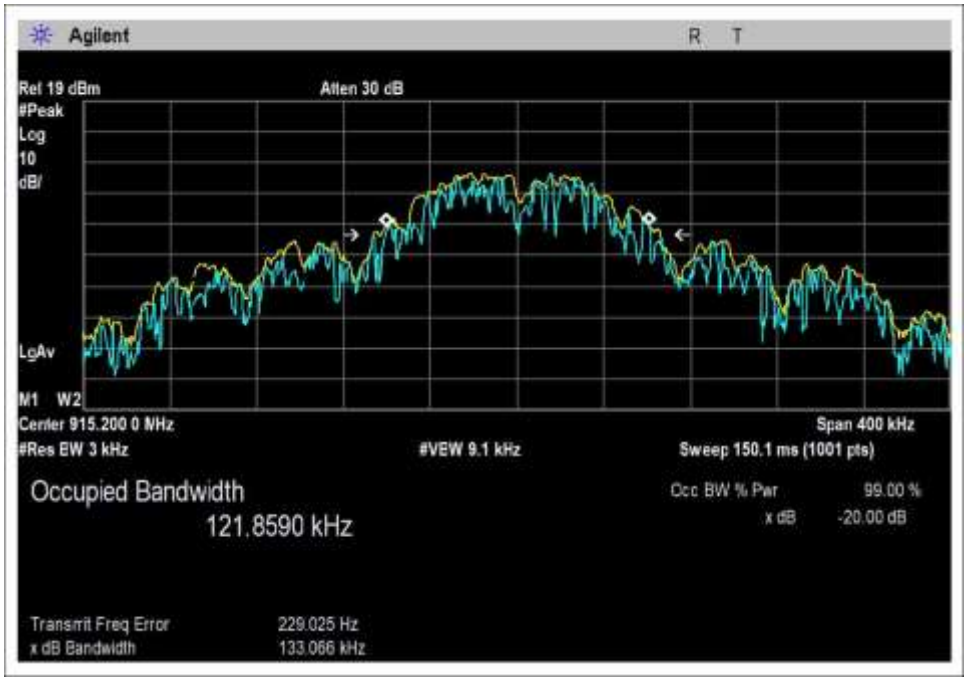


High Channel, 150k

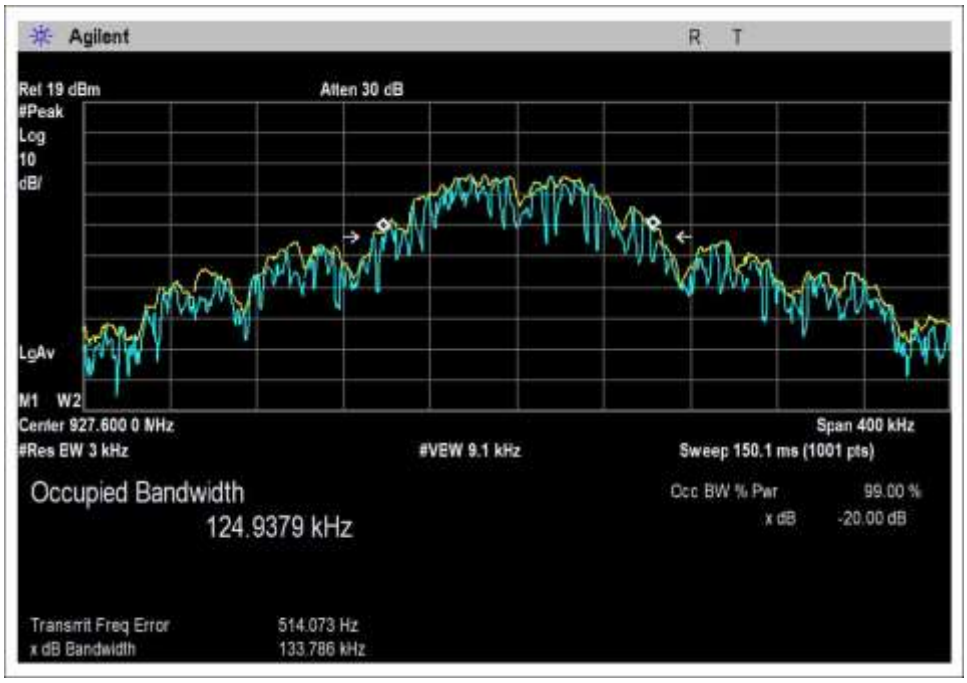
OQPSK



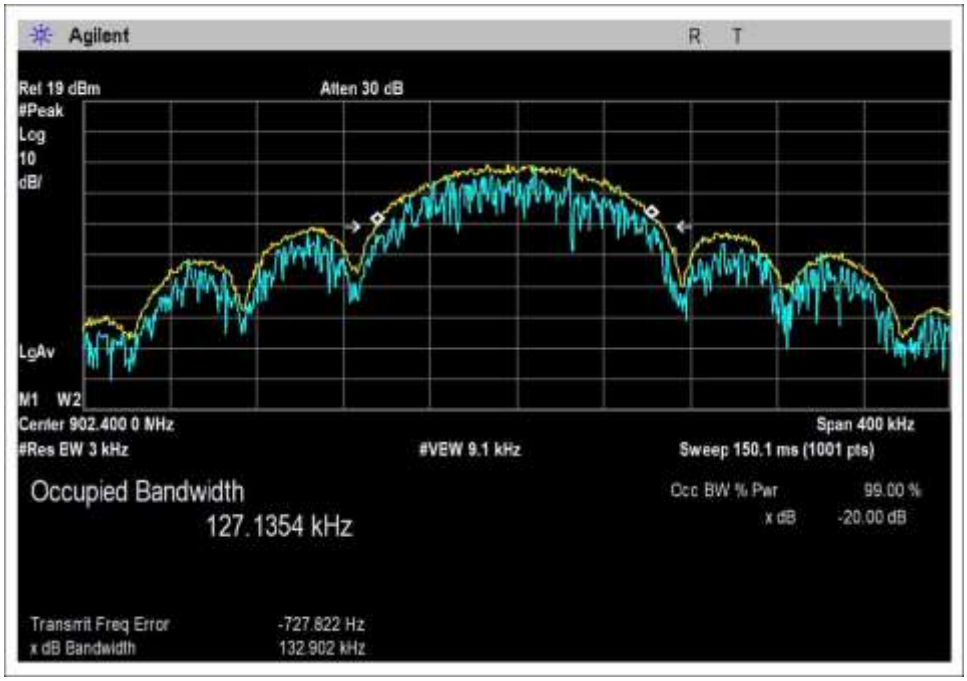
Low Channel, 6.25k



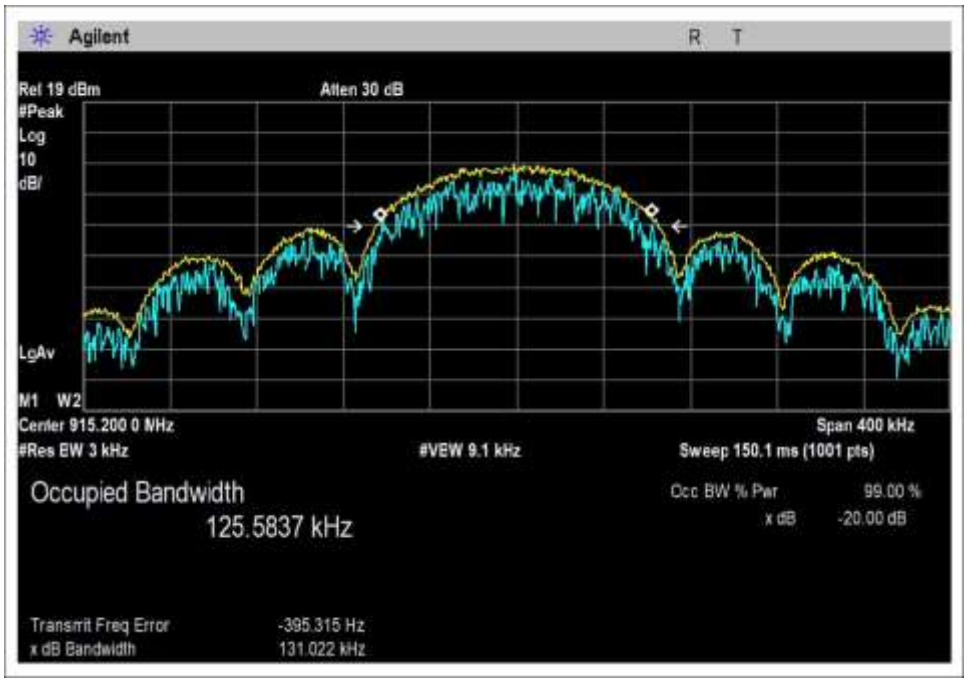
Middle Channel, 6.25k



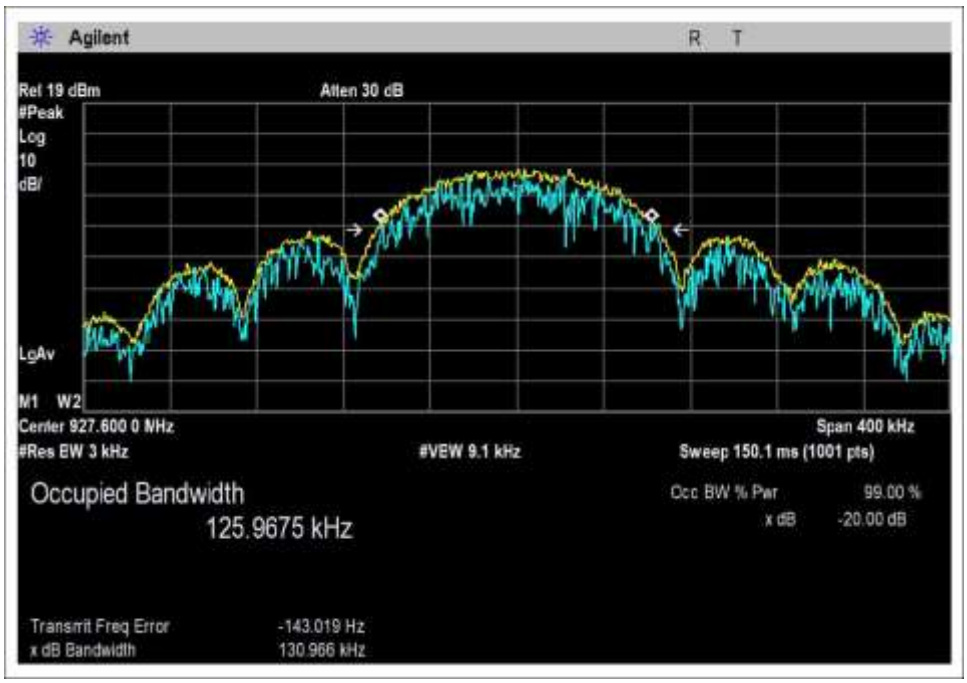
High Channel, 6.25k



Low Channel, 12.5k



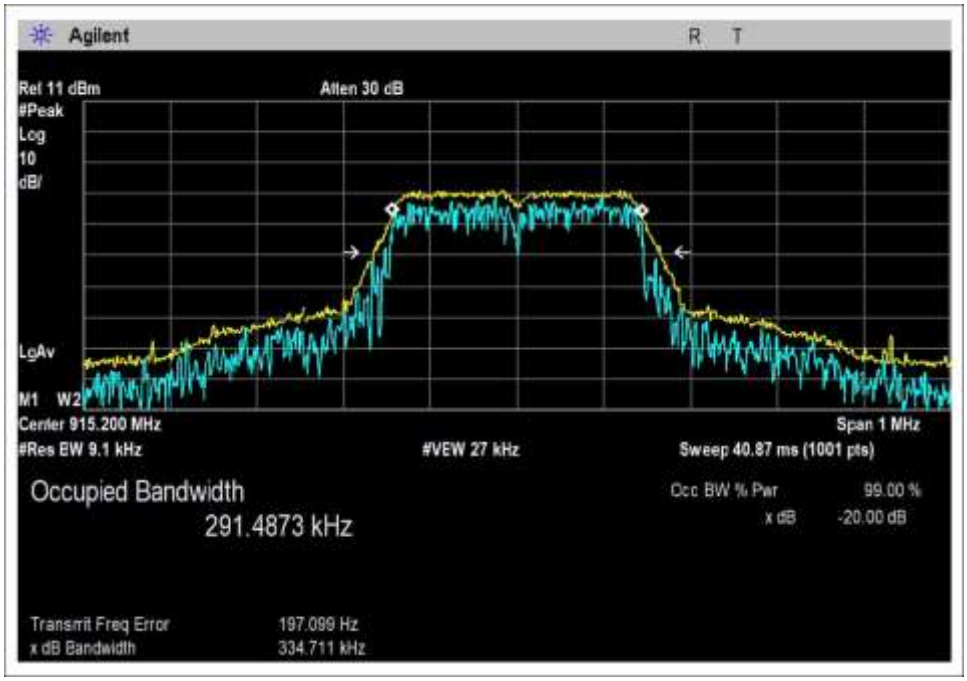
Middle Channel, 12.5k



High Channel, 12.5k

OFDM

Low Channel, 200k

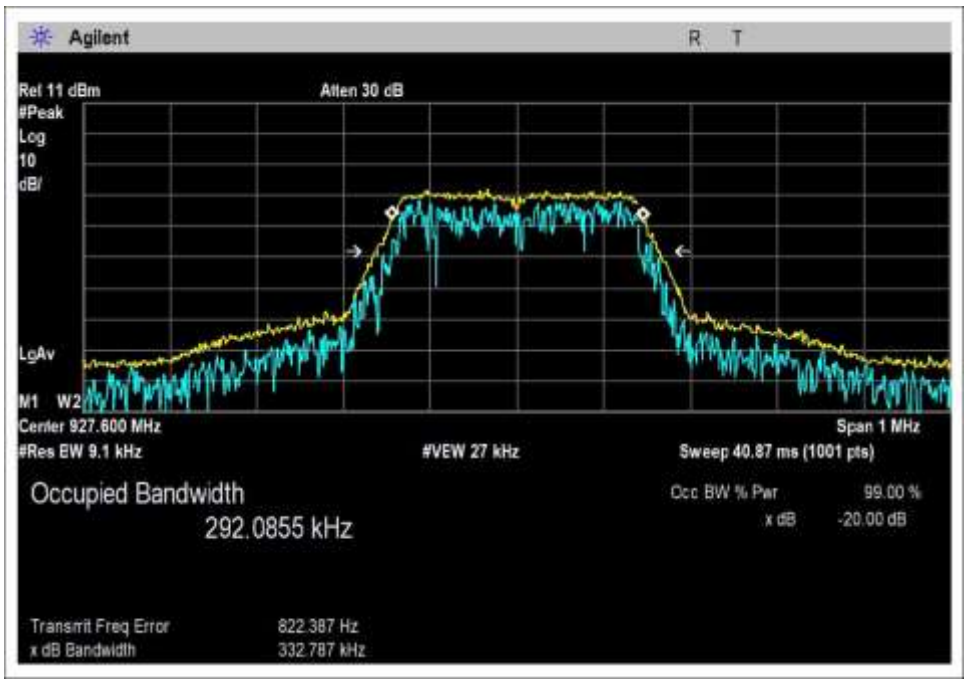


Middle Channel, 200k

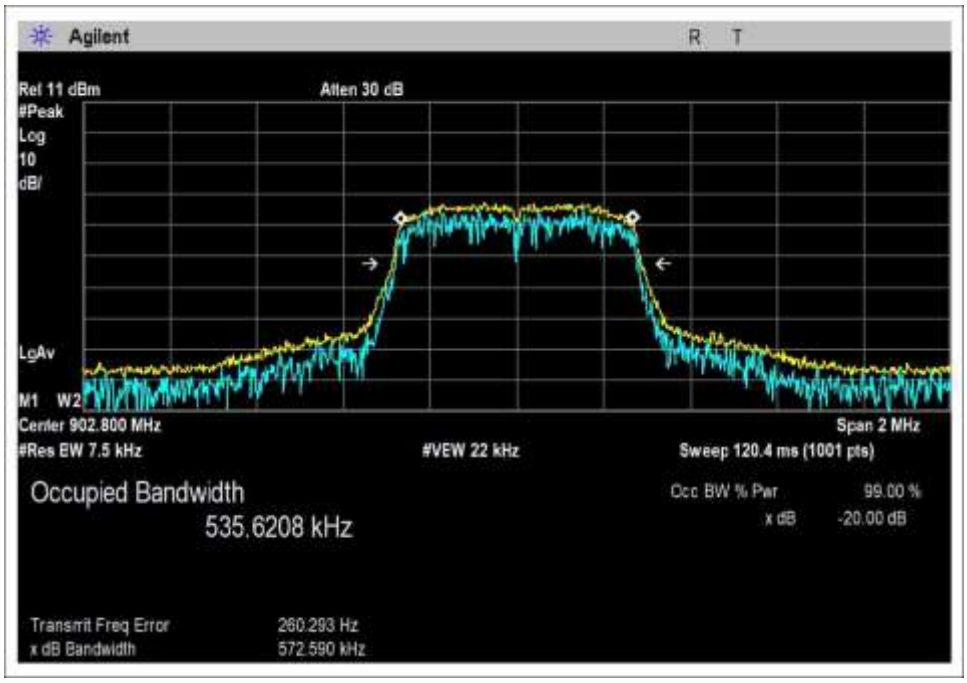
High Channel, 200k

Low Channel, 600k

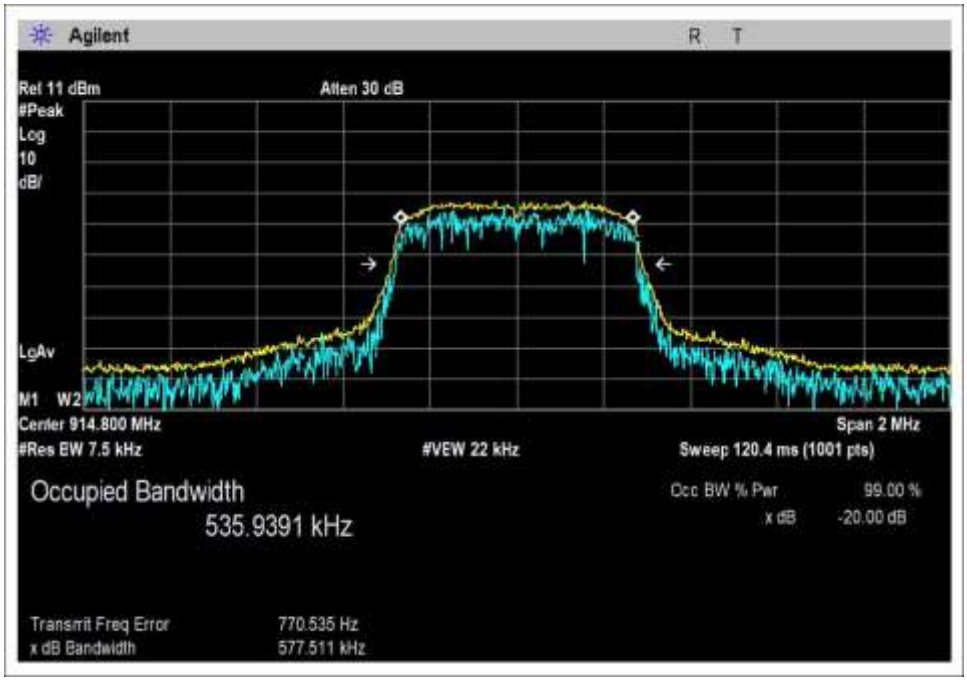
Middle Channel, 600k



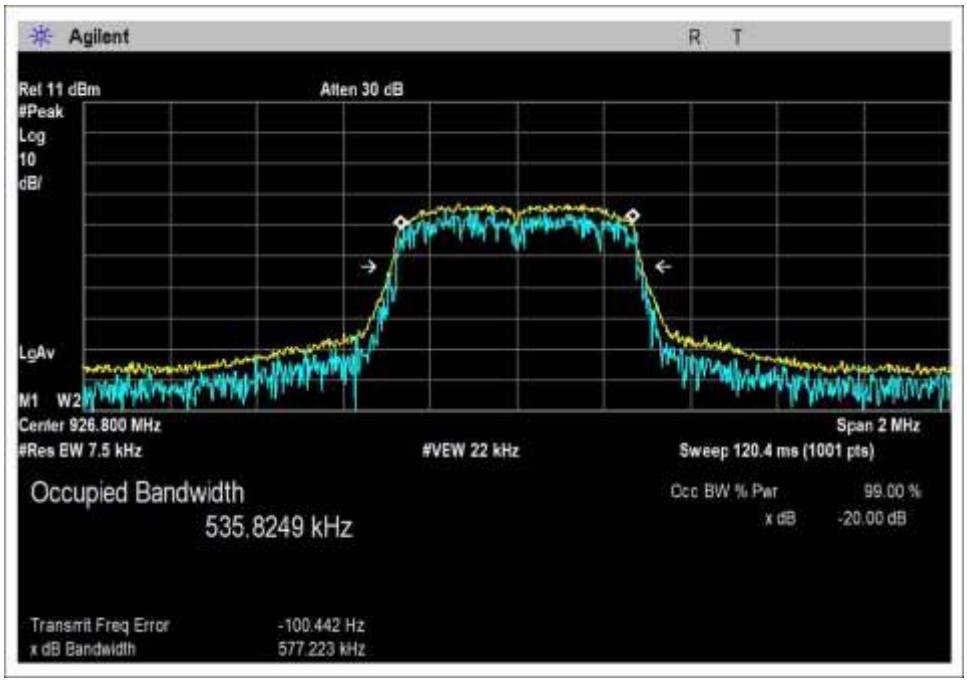
High Channel, 600k



Low Channel, 1.2M



Middle Channel, 1.2M

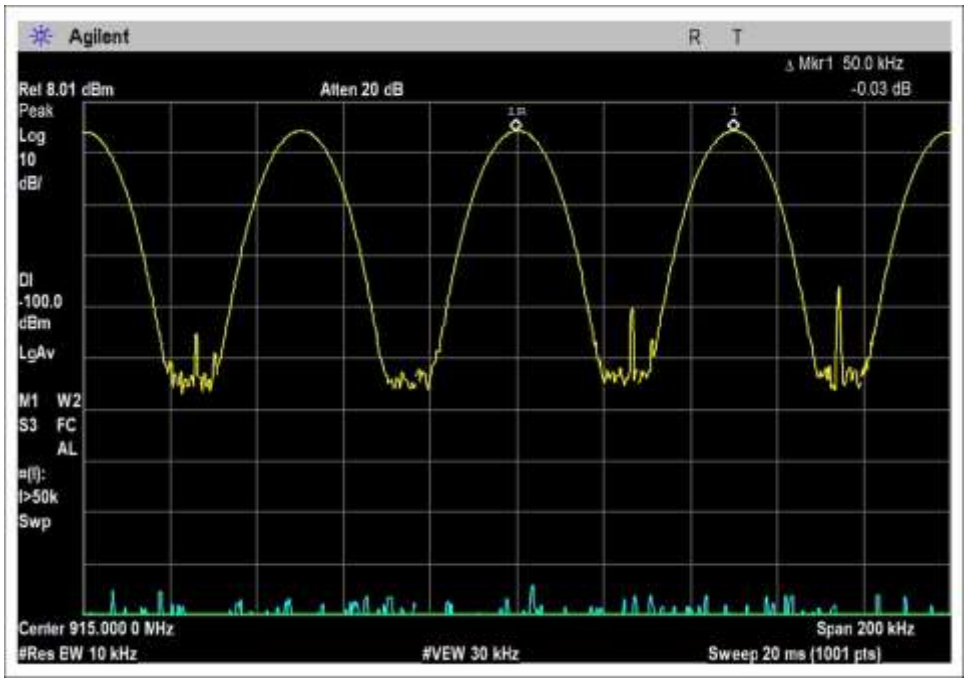


High Channel, 1.2M

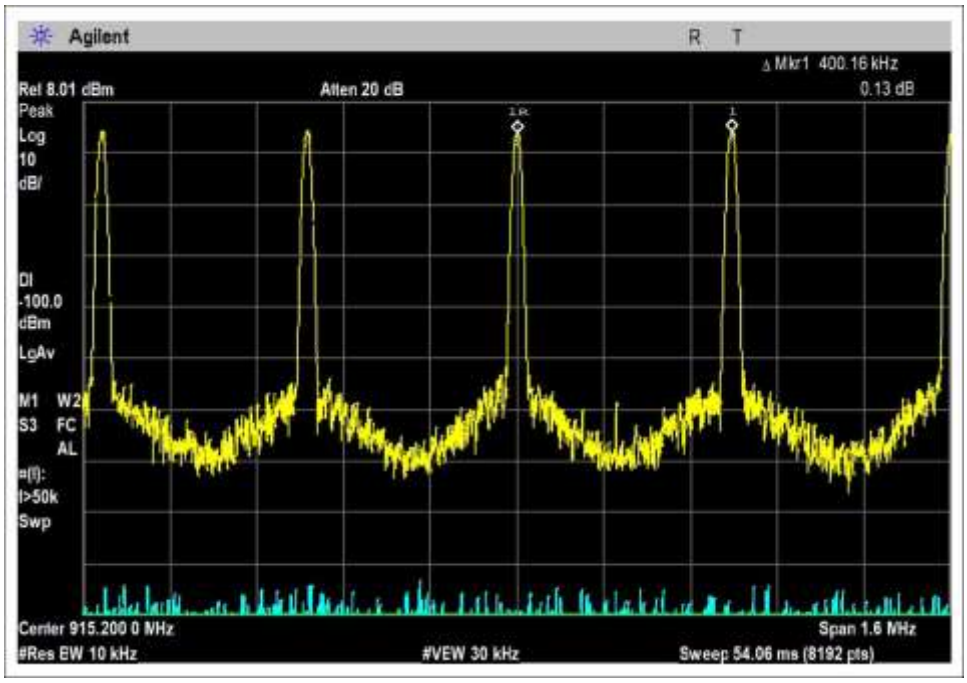
15.247(a)(1) Carrier Separation

Test Data Summary				
Limit applied: 20dB bandwidth of the hopping channel.				
Antenna Port	**Operational Mode**	**Measured (kHz)**	**Limit (kHz)**	**Results**
1	50kHz Channel Plan (10k GFSK)	50.0	>20.35	Pass
1	400kHz Channel Plan (50k GFSK, 150k GFSK, 6.25 OQPSK, 12.5 OQPSK, 200k OFDM, 600k OFDM)	400.16	>335.18	Pass
1	800kHz Channel Plan (1.2M OFDM Hybrid Mode)	800.9	>577.51	Pass

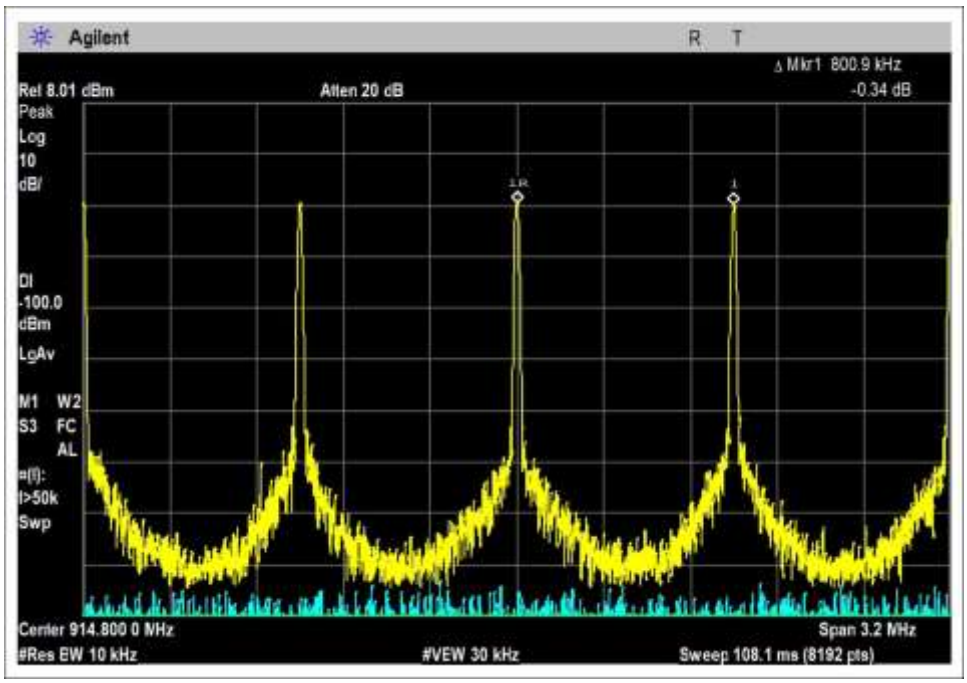
Plots



50kHz



400kHz

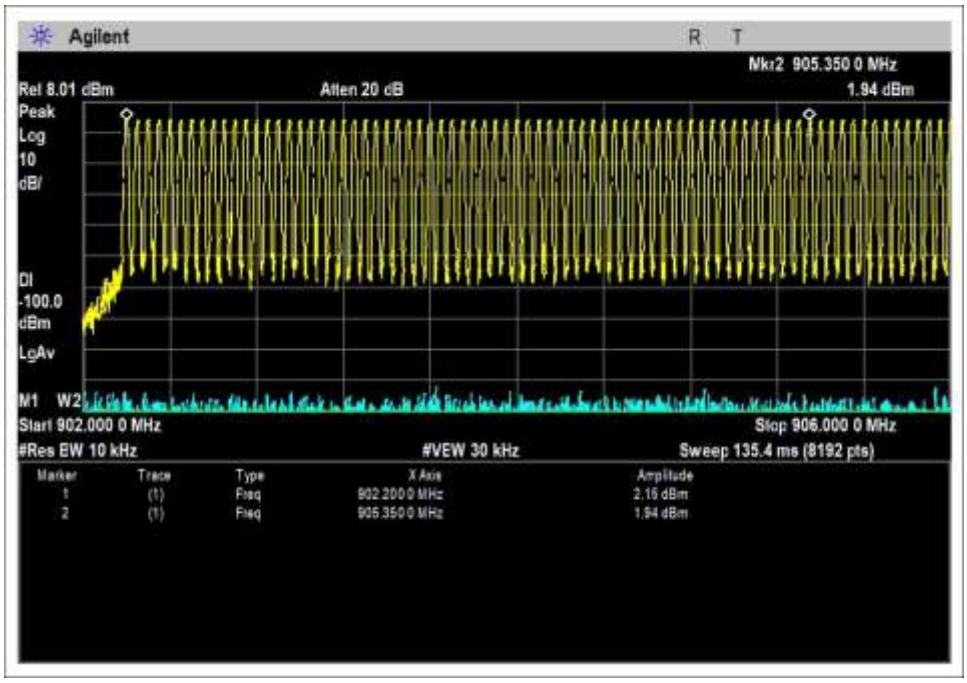


800kHz

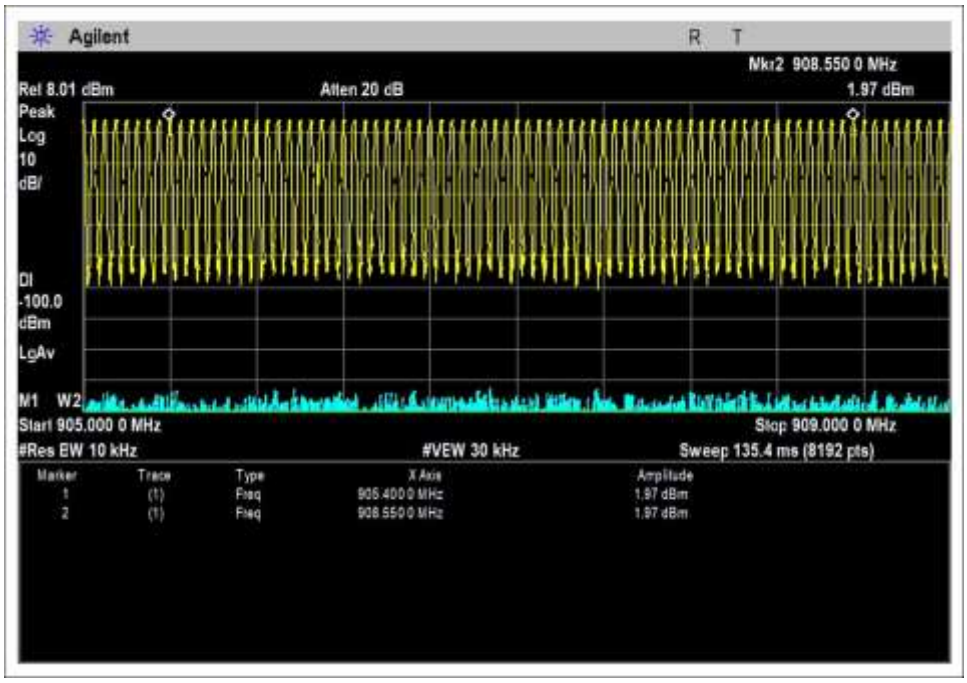
15.247(a)(1)(i) Number of Hopping Channels

Test Data Summary				
$Limit = \begin{cases} 50\ Channels \mid 20\ dB\ BW < 250kHz \\ 25\ Channels \mid 20\ dB\ BW \geq 250kHz \end{cases}$				
Antenna Port	**Operational Mode**	**Measured (Channels)**	**Limit (Channels)**	**Results**
1	50kHz Channel Plan (10k GFSK)	512	≥50	Pass
1	400kHz Channel Plan (50k GFSK, 150k GFSK, 6.25 OQPSK, 12.5 OQPSK, 200k OFDM, 600k OFDM)	64	≥50	Pass
1	800kHz Channel Plan (1.2M OFDM Hybrid Mode)	31	≥25	Pass

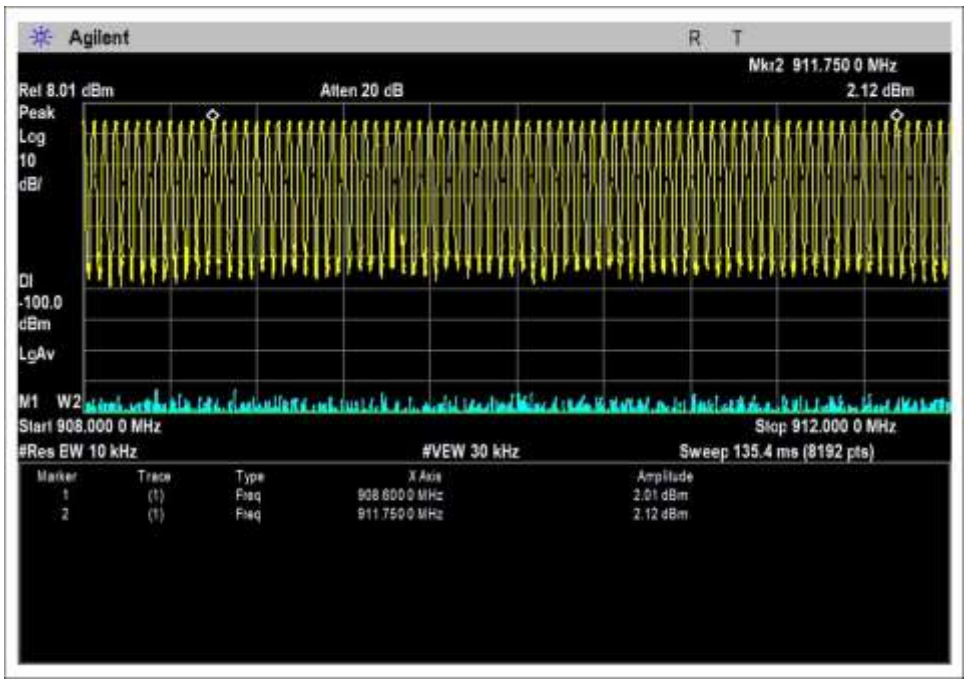
Plots



50kHz, 1st x 64ch



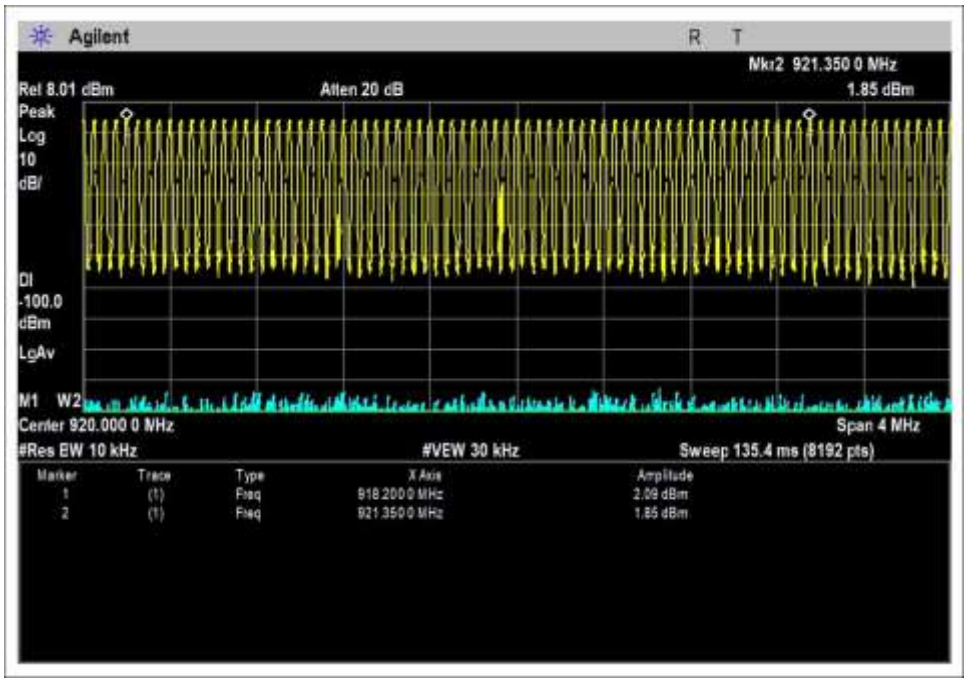
50kHz, 2nd x 64ch



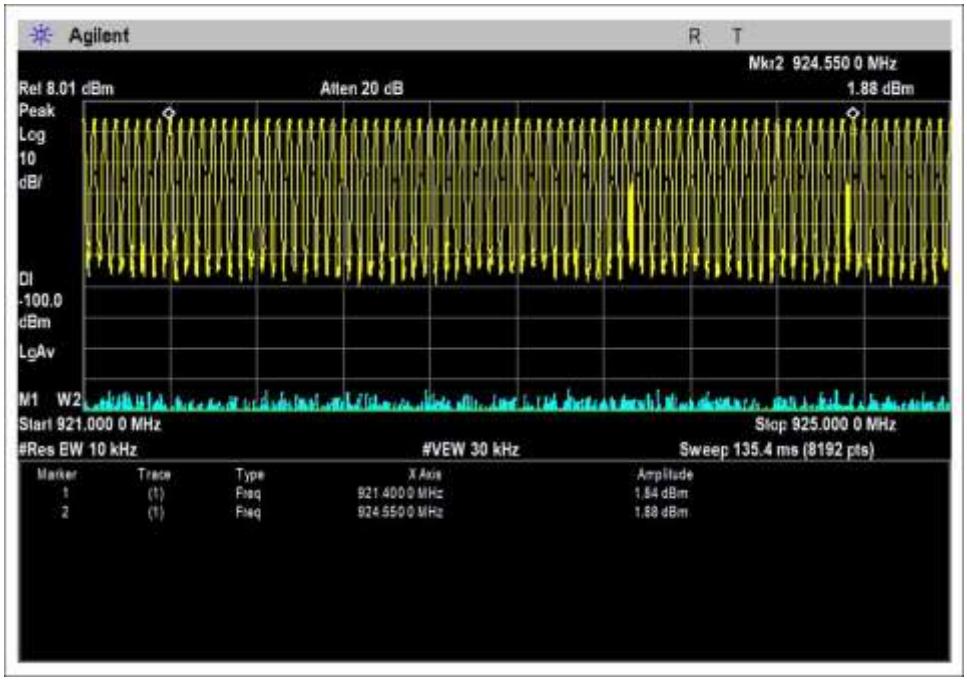
50kHz, 3rd x 64ch

50kHz, 4th x 64ch

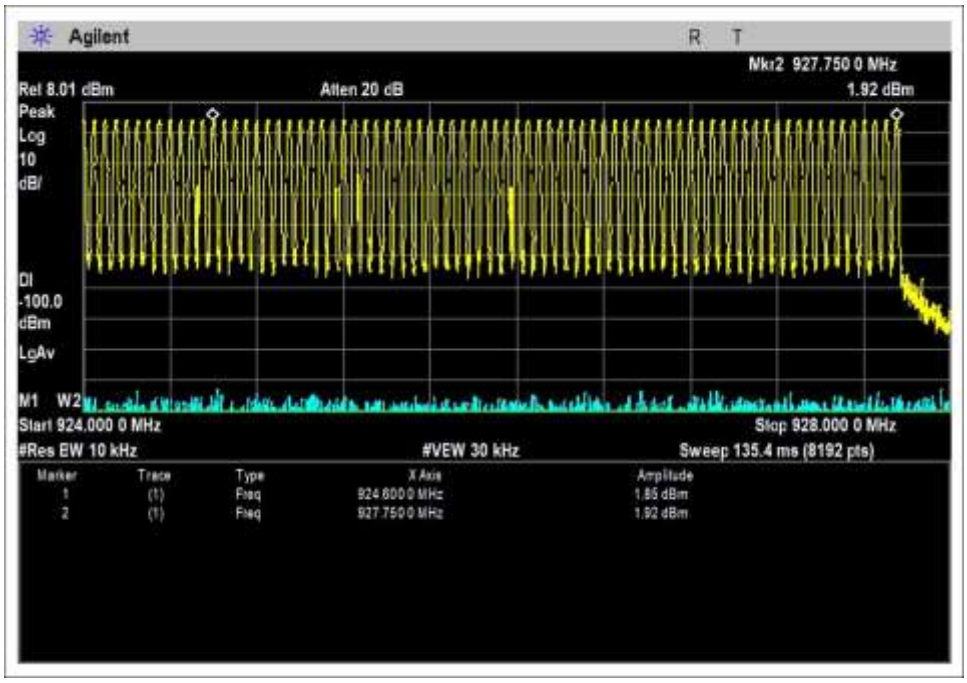
50kHz, 5th x 64ch



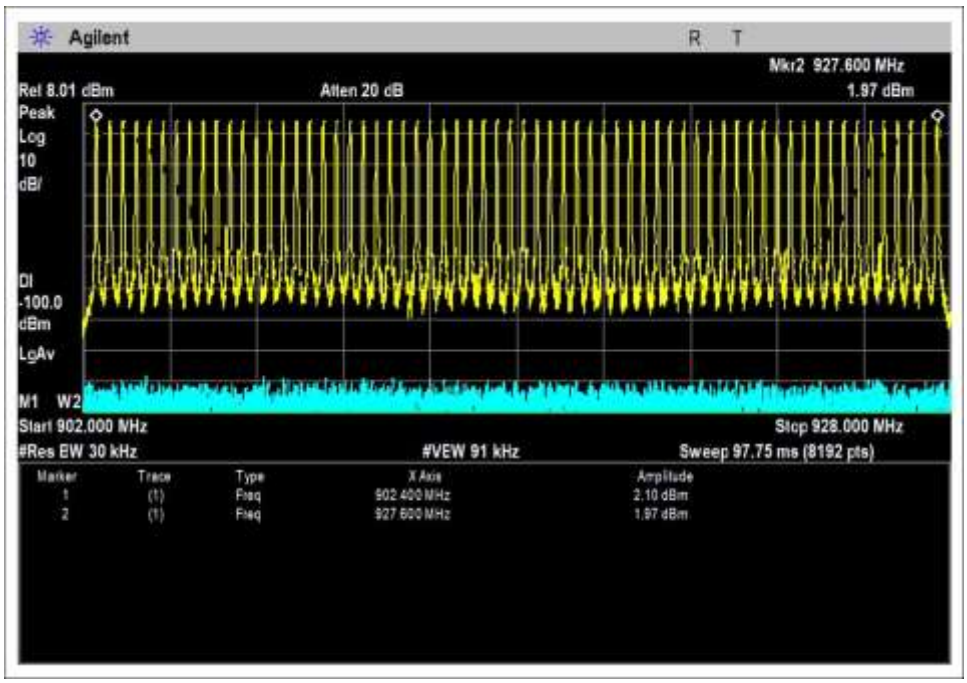
50kHz, 6th x 64ch



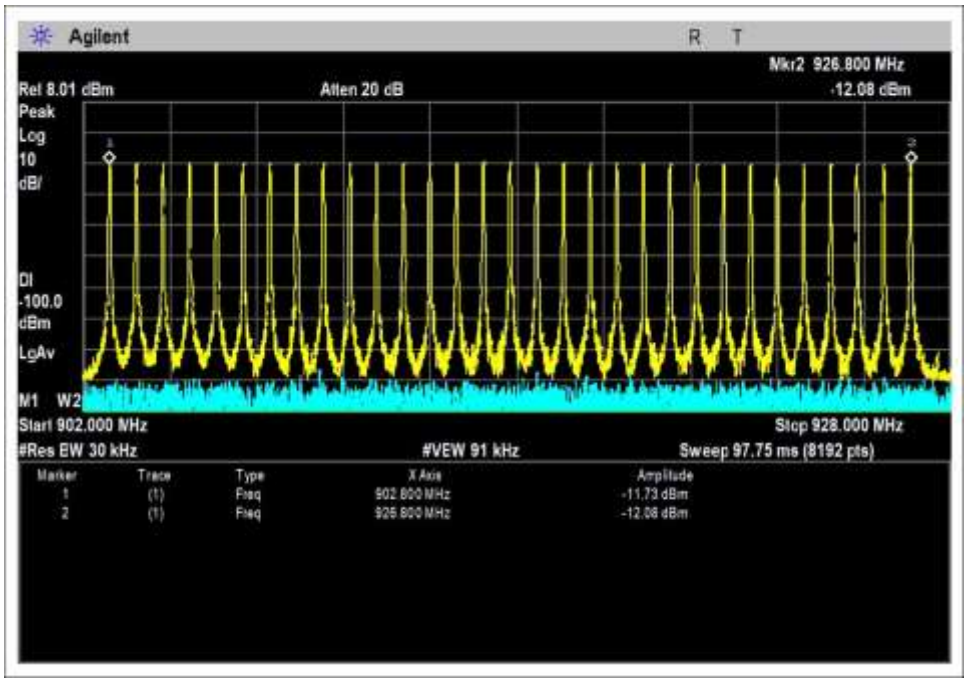
50kHz, 7th x 64ch



50kHz, 8th x 64ch



400kHz


Agilent
R T
Mkr2 926.800 MHz
Ref 8.01 dBm
Atten 20 dB
-12.08 dBm
Peak
Log
10
dB/
Dl
-100.0
dBm
LgAv
M1 W2
Start 902.000 MHz
Stop 928.000 MHz
#Res EW 30 kHz
#VEW 91 kHz
Sweep 97.75 ms (8192 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 902.800 MHz -11.73 dBm
2 (1) Freq 926.800 MHz -12.08 dBm

800kHz

15.247(a)(1)(iii) Average Time of Occupancy

Manufacturer's Declaration

CKC Laboratories was not contracted to perform the testing due to the required equipment and firmware to exercise the EUT's multiple pseudo-random hopping sequences was not available and that the complexity of the different modulations and modes depend on the device to be in a fully operating network environment.

Therefore, the manufacturer declares the following:

With the multiple modulations, modes and hop tables, the mode with the worst-case Time of Occupancy to demonstrate 400mS compliance is 399.8mS in 10 seconds, since this modulation is > 250kHz and < 500 kHz OBW. Each session of multiple short transmissions takes place on one of 64 different channels in a pseudorandom sequence. The algorithm that determines the pseudo-random hop sequence ensures all 64 channels are used equally on the average.

Itron employs hopping patterns based on a pseudo-random sequence generated by an algorithm. The algorithm can have multiple components generated, that each has its own pseudo-random sequence.

The firmware insures the channels are used in the prescribed pseudo random order, therefore, it maintains equal channel usage.

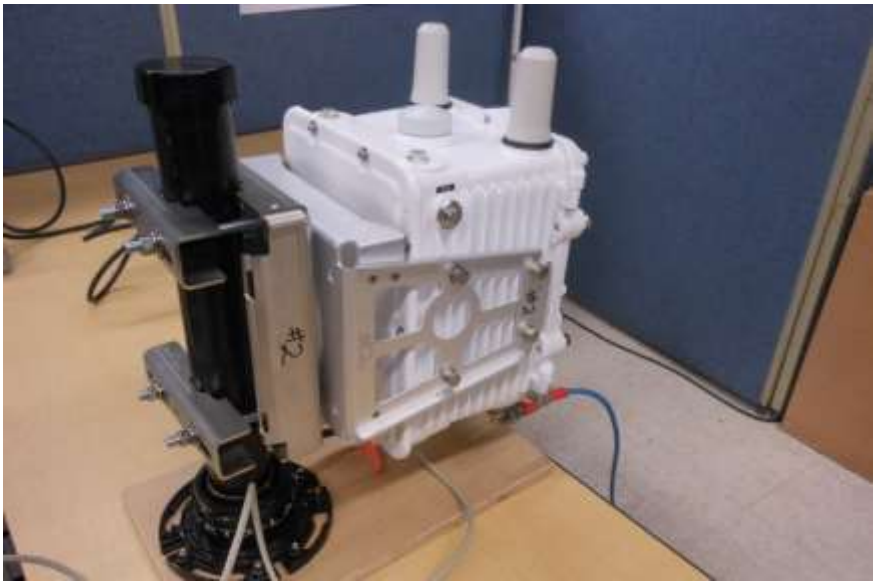
The system has single channel receiver bandwidths that match the transmitter's modulation bandwidth that is enabled.

With the transmitter and receiver in synchronization within the network, transmitters switch frequencies in synchronization with the receiver.

When the transmitter needs to send a continuous or long data stream, total time of the packet transmissions is monitored to comply with dwell time requirement of 400ms in the appropriate 10s or 20s window depending on the modulation/mode enabled.

This device does not employ any hopping avoidance techniques.

Test Setup Photo



15.247(b)(2) Output Power

Test Data Summary - Voltage Variations					
Frequency (MHz)	Modulation / Ant Port	$V_{Minimum}$ (dBm)	$V_{Nominal}$ (dBm)	$V_{Maximum}$ (dBm)	Max Deviation from $V_{Nominal}$ (dB)
902.2	10k GFSK	29.4	29.3	29.3	0.1
915	10k GFSK	29.3	29.4	29.4	0.1
927.75	10k GFSK	29.2	29.2	29.2	0.1

Test performed using operational mode with the highest output power, representing worst case.

Parameter Definitions:

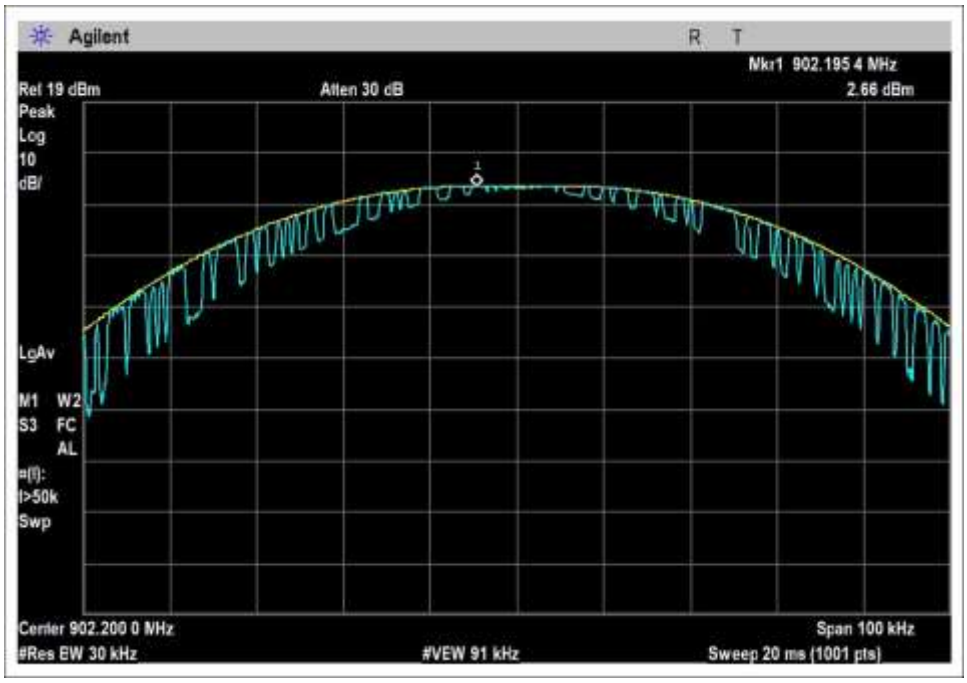
Measurements performed at input voltage according to manufacturer specification.

Parameter	Value
$V_{Nominal}$:	115VAC
$V_{Minimum}$:	100VAC
$V_{Maximum}$:	240VAC

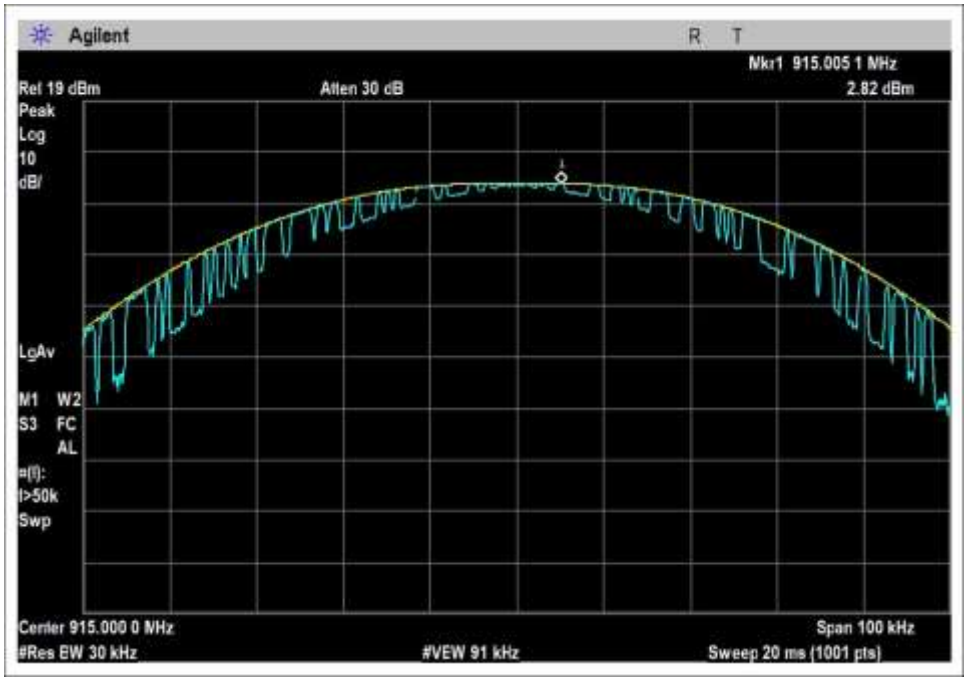
Test Data Summary - RF Conducted Measurement					
$Limit = \begin{cases} 30dBm\ Conducted/36dBm\ EIRP \mid \geq 50\ Channels \\ 24dBm\ Conducted/30dBm\ EIRP \mid < 50\ Channels\ (\min 25) \end{cases}$					
Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm)	Limit (dBm)	Results
902.2	10k GFSK	External Colinear Omni (5.5dBi max)	29.3	≤30	Pass
915			29.4		
927.75			29.2		
902.4	50k GFSK	External Colinear Omni (5.5dBi max)	29.2	≤30	Pass
915.2			29.2		
927.6			29.1		
902.4	150k GFSK	External Colinear Omni (5.5dBi max)	29.3	≤30	Pass
915.2			29.3		
927.6			29.2		
902.4	6.25k OQPSK	External Colinear Omni (5.5dBi max)	29.4	≤30	Pass
915.2			29.5		
927.6			29.2		
902.4	12.5k OQPSK	External Colinear Omni (5.5dBi max)	29.4	≤30	Pass
915.2			29.5		
927.6			29.3		
902.4	200k OFDM	External Colinear Omni (5.5dBi max)	24.8	≤30	Pass
915.2			24.8		
927.6			24.6		
902.4	600k OFDM	External Colinear Omni (5.5dBi max)	24.6	≤30	Pass
915.2			24.5		
927.6			24.5		
902.8	1.2M OFDM (Hybrid)	External Colinear Omni (5.5dBi max)	24.6	≤30	Pass
914.8			24.7		
926.8			24.6		

Plots

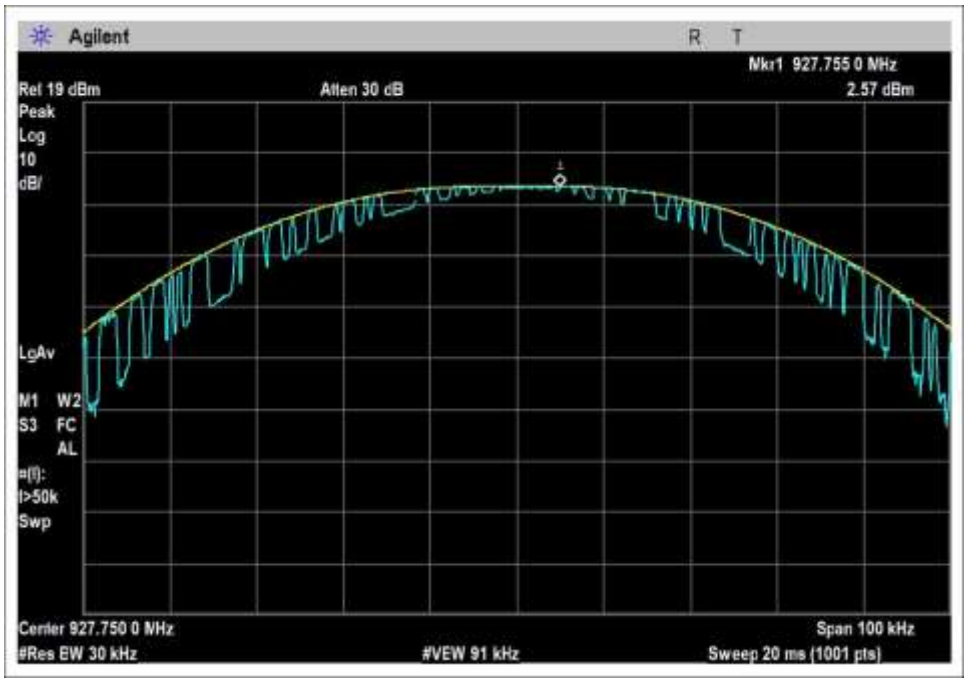
GFSK



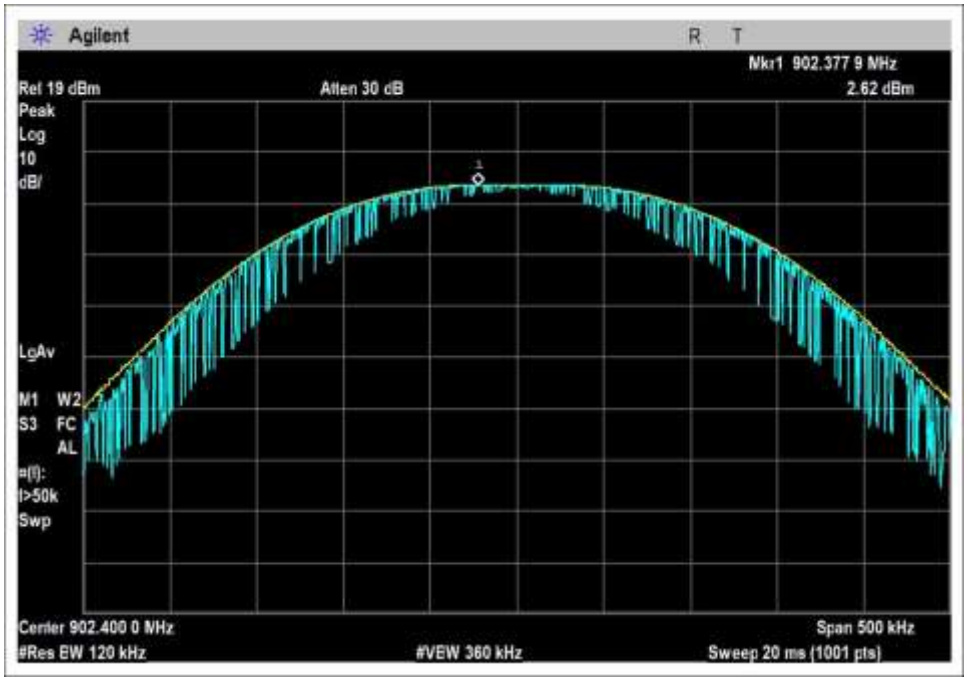
Low Channel, 10k



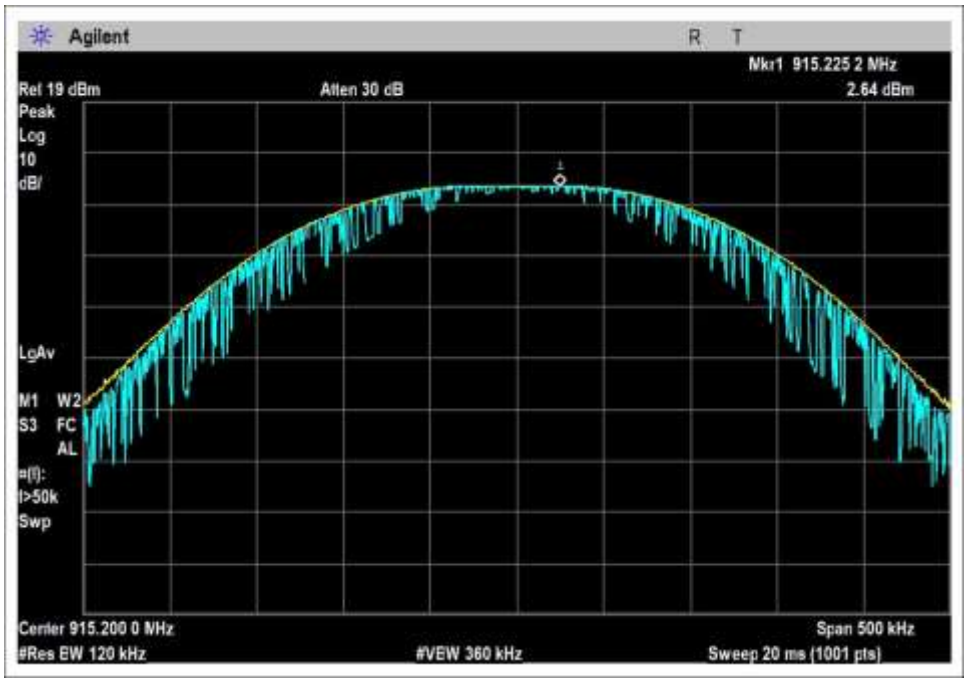
Middle Channel, 10k



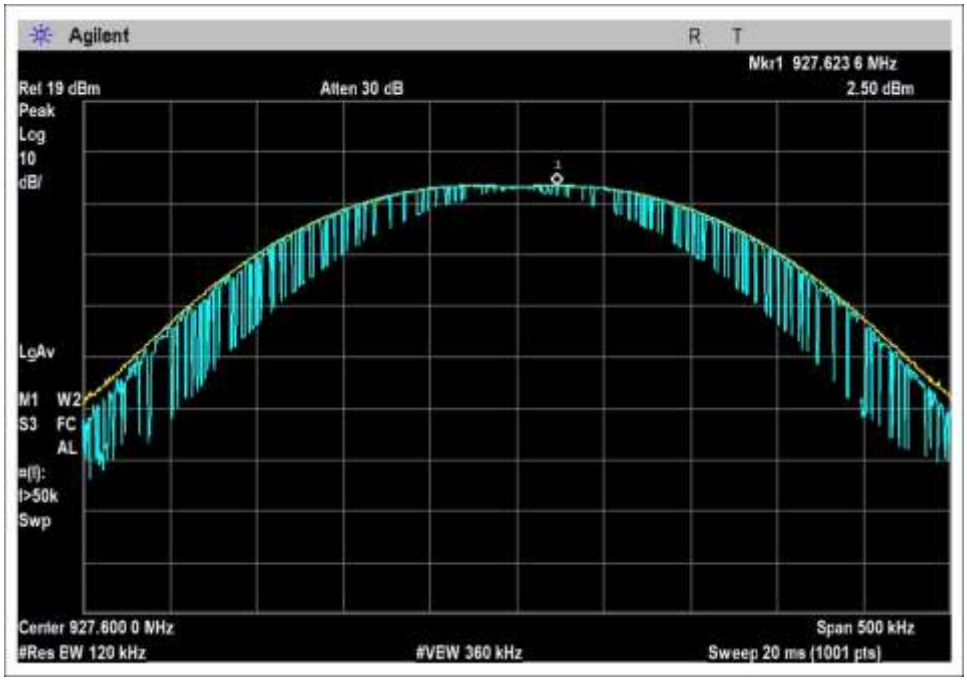
High Channel, 10k



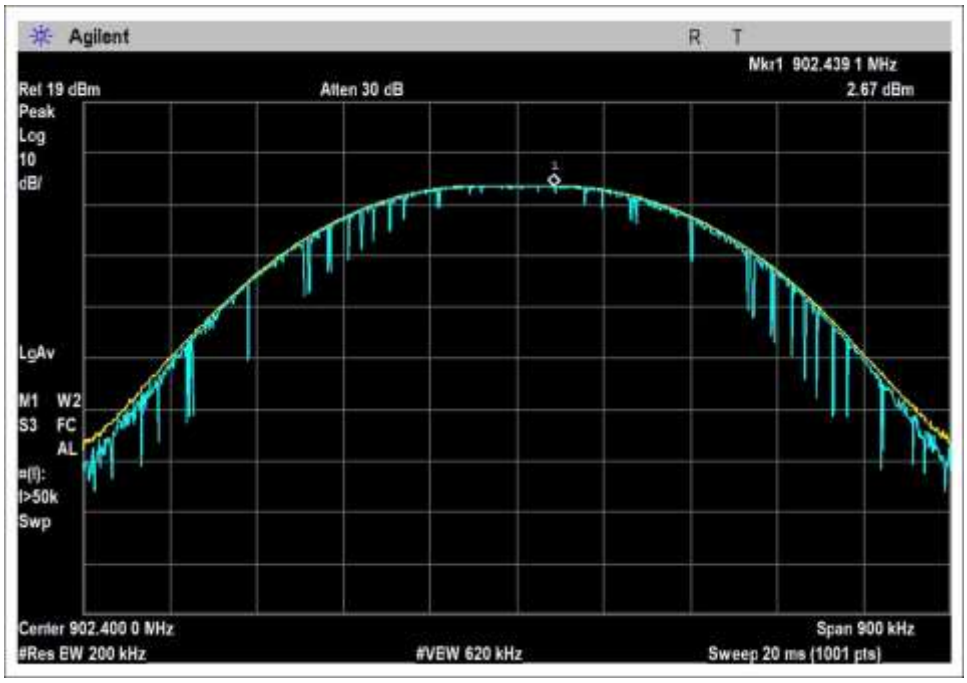
Low Channel, 50k



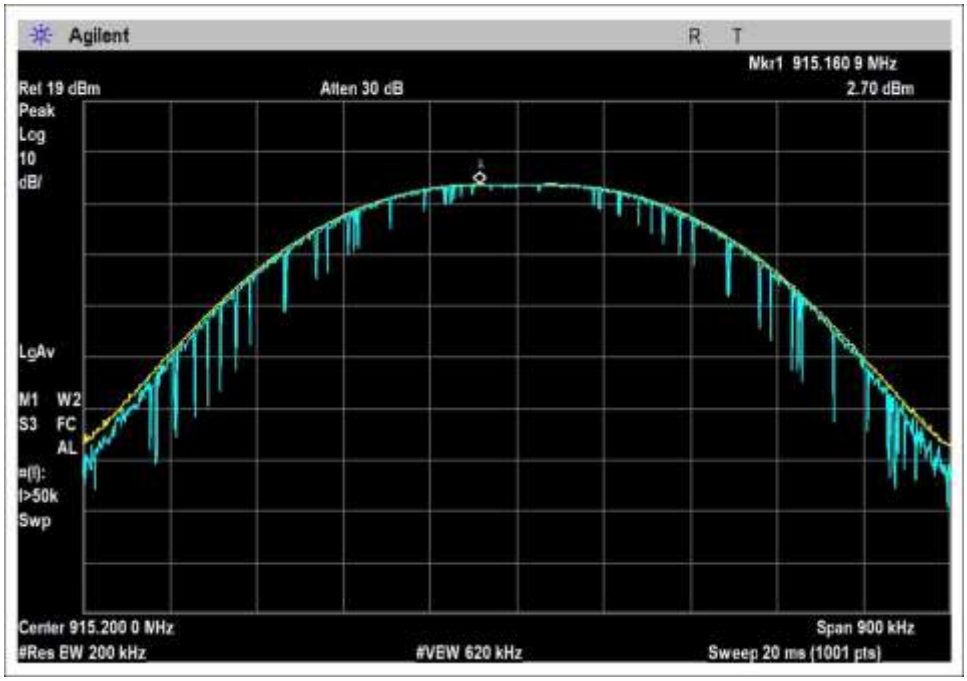
Middle Channel, 50k



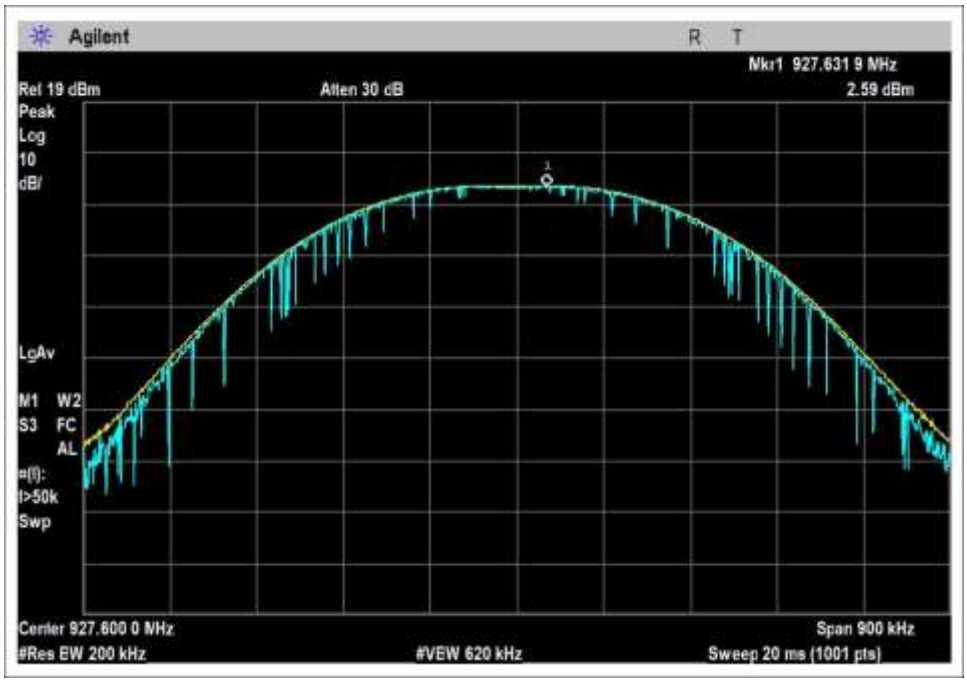
High Channel, 50k



Low Channel, 150k

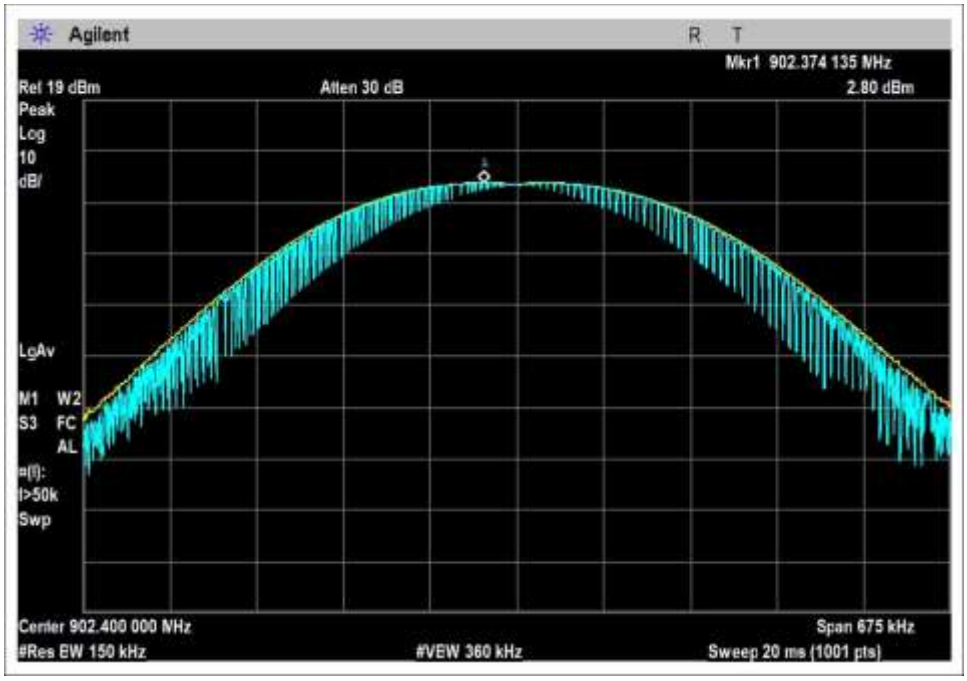


Middle Channel, 150k

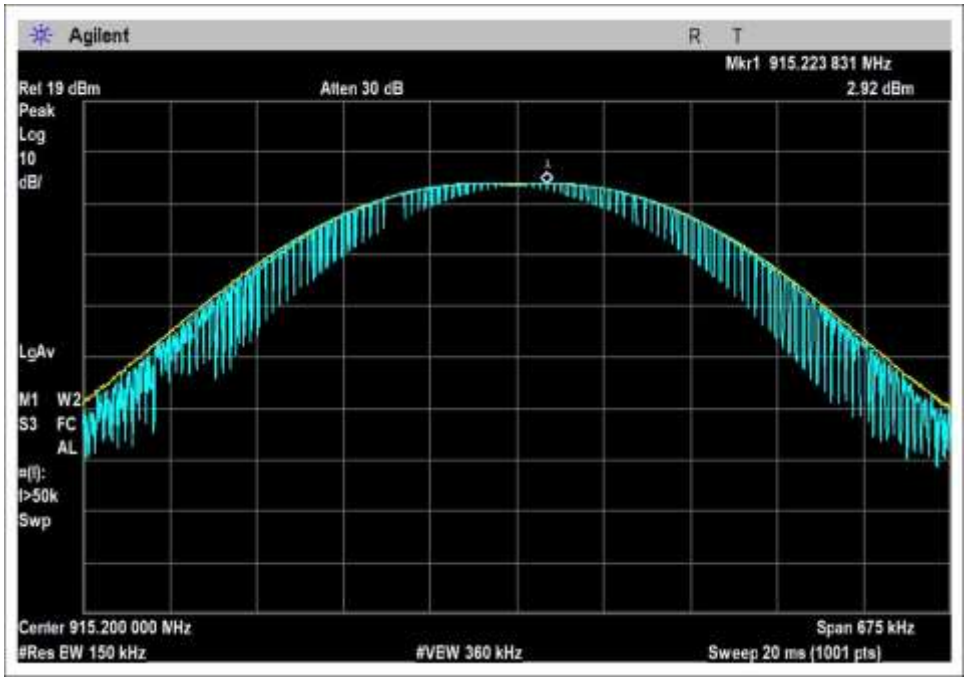


High Channel, 150k

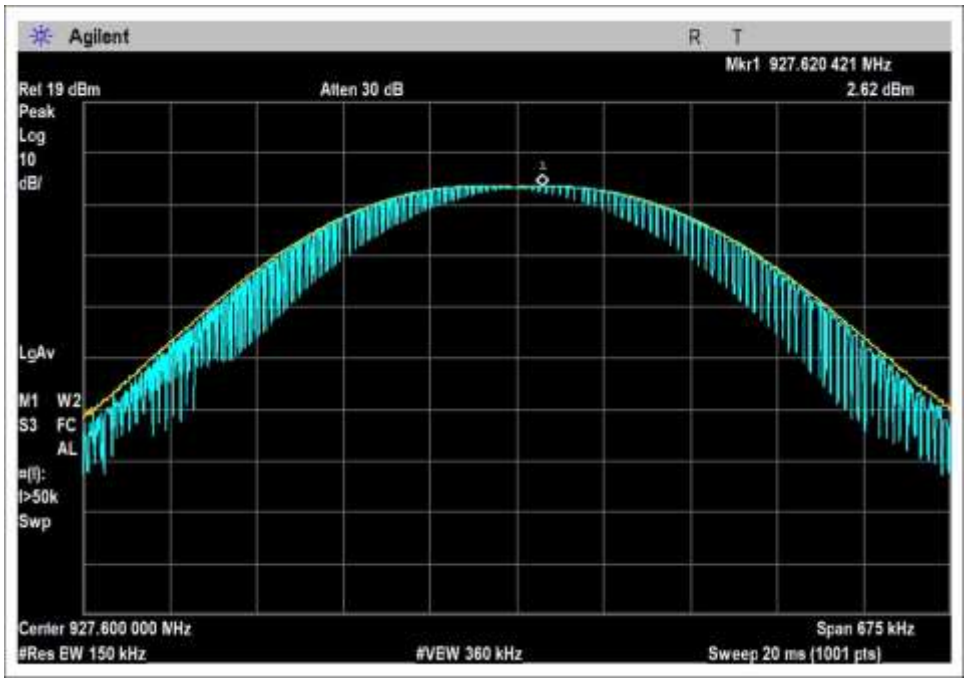
OQPSK



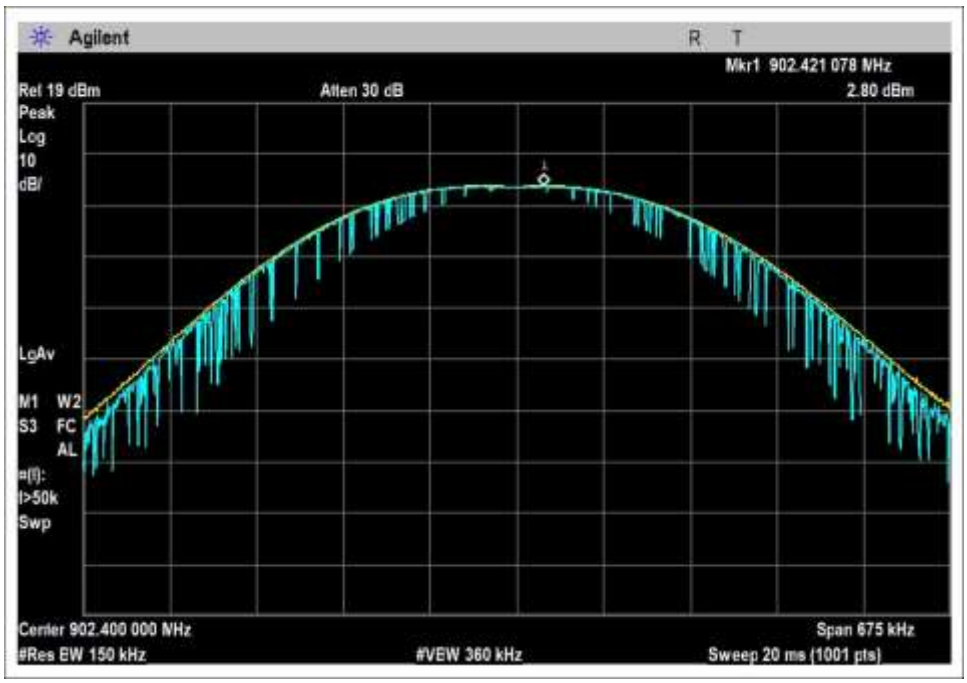
Low Channel, 6.25k



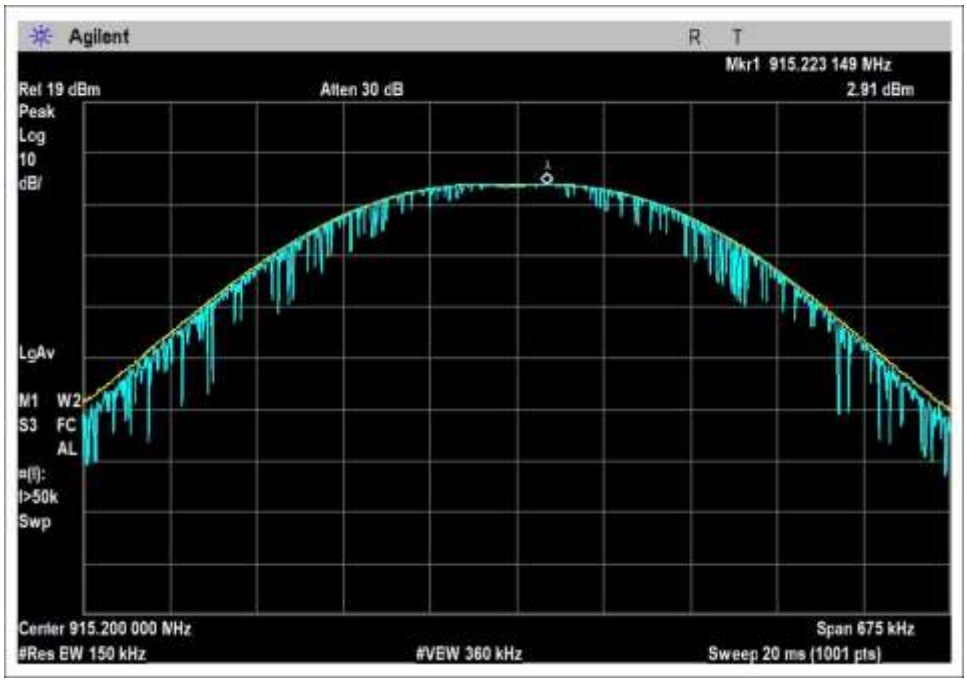
Middle Channel, 6.25k



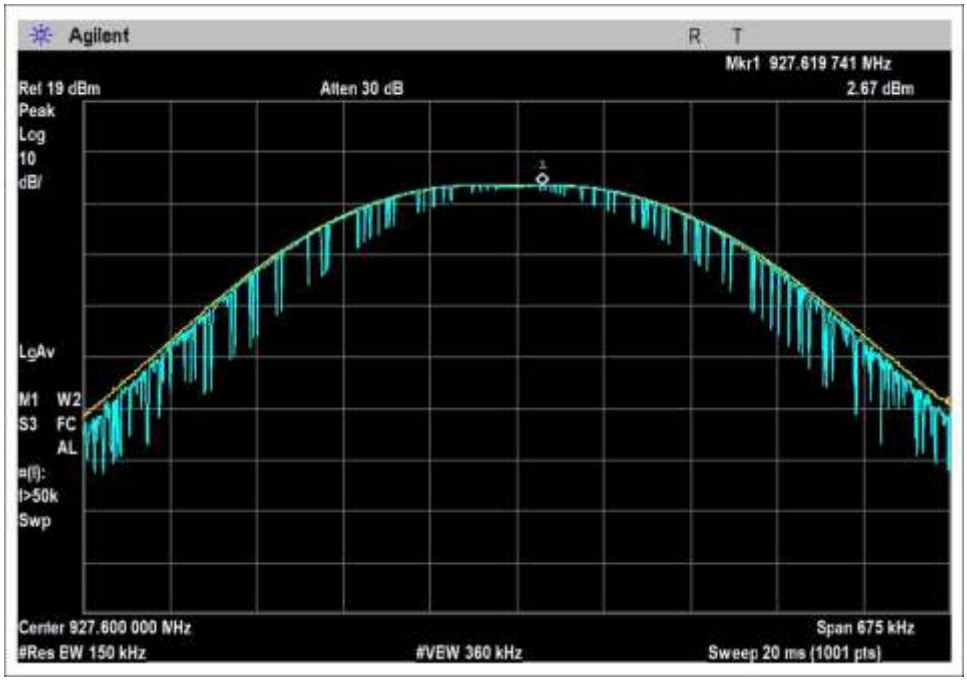
High Channel, 6.25k



Low Channel, 12.5k

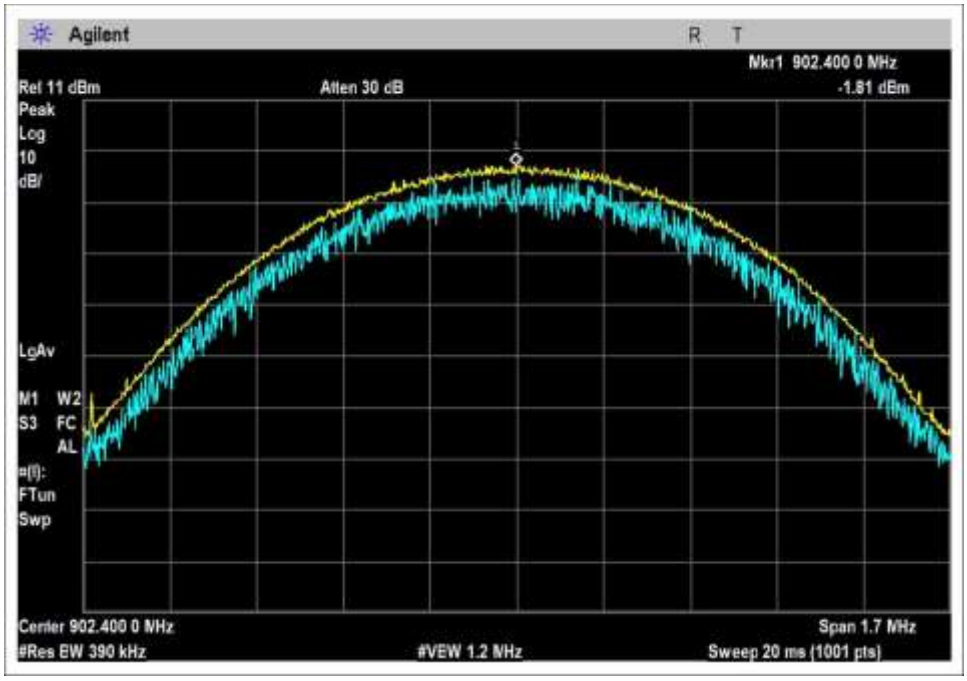


Middle Channel, 12.5k

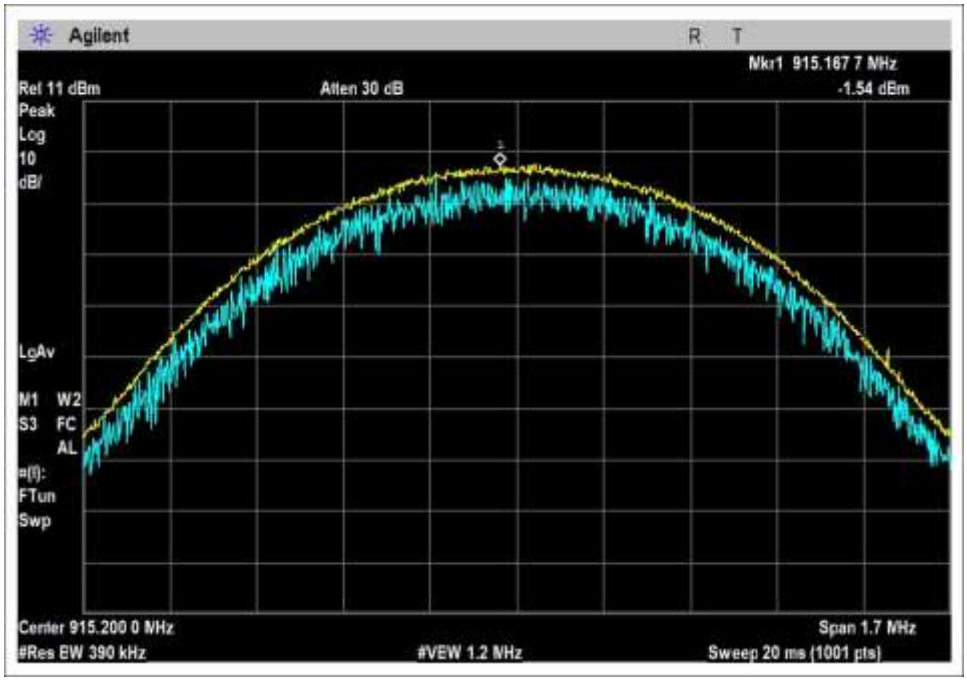


High Channel, 12.5k

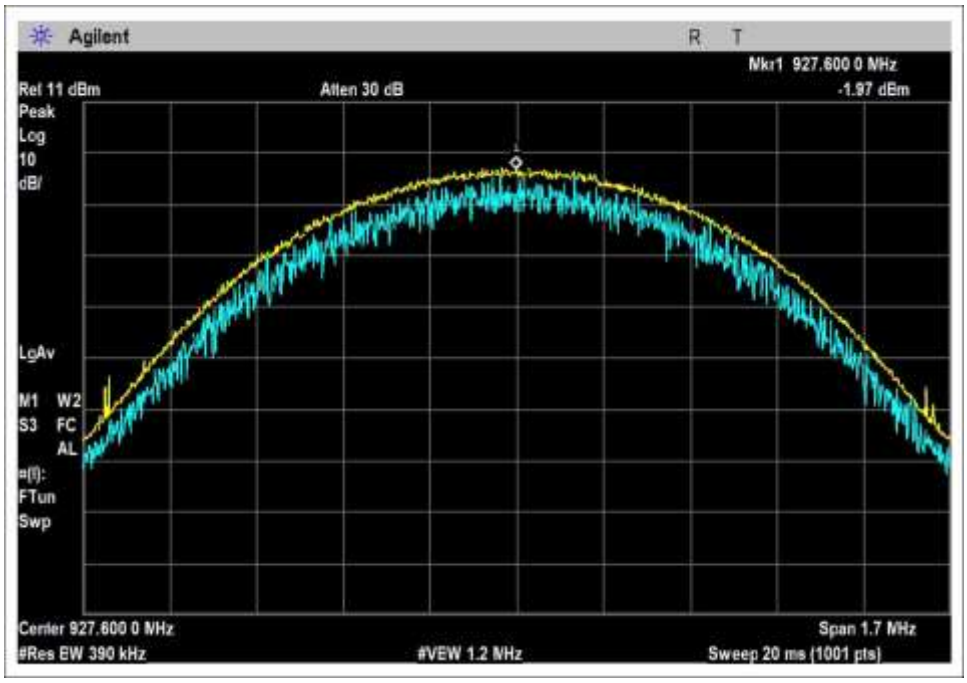
OFDM



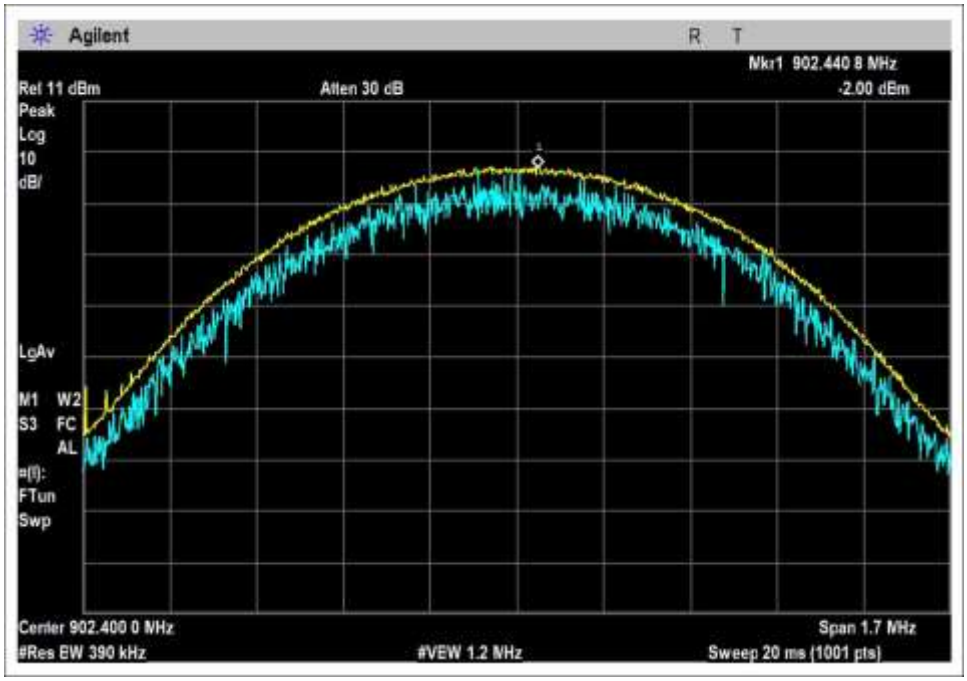
Low Channel, 200k



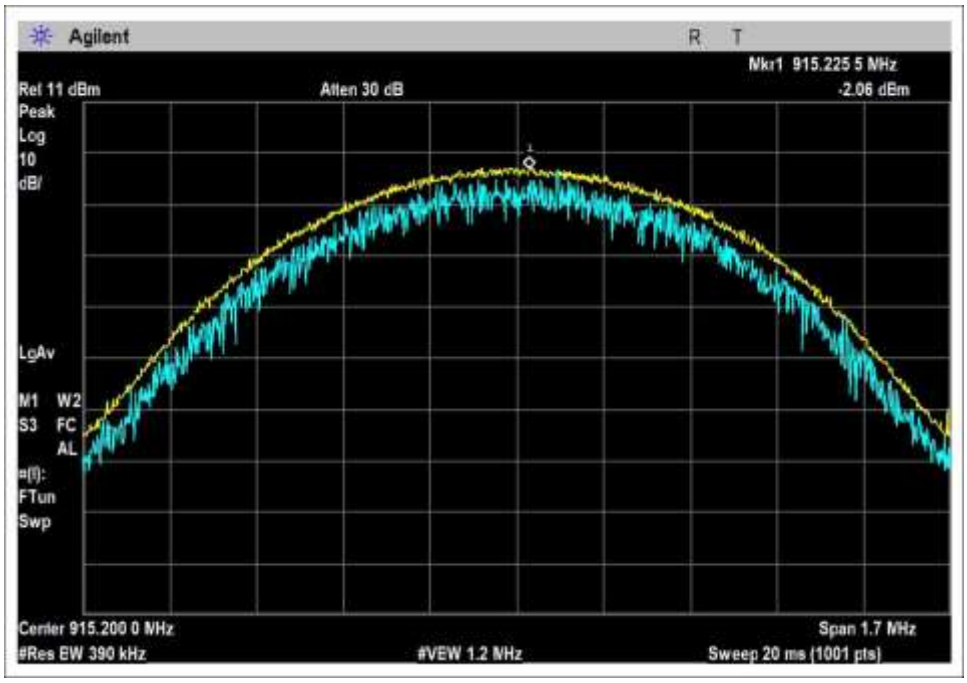
Middle Channel, 200k



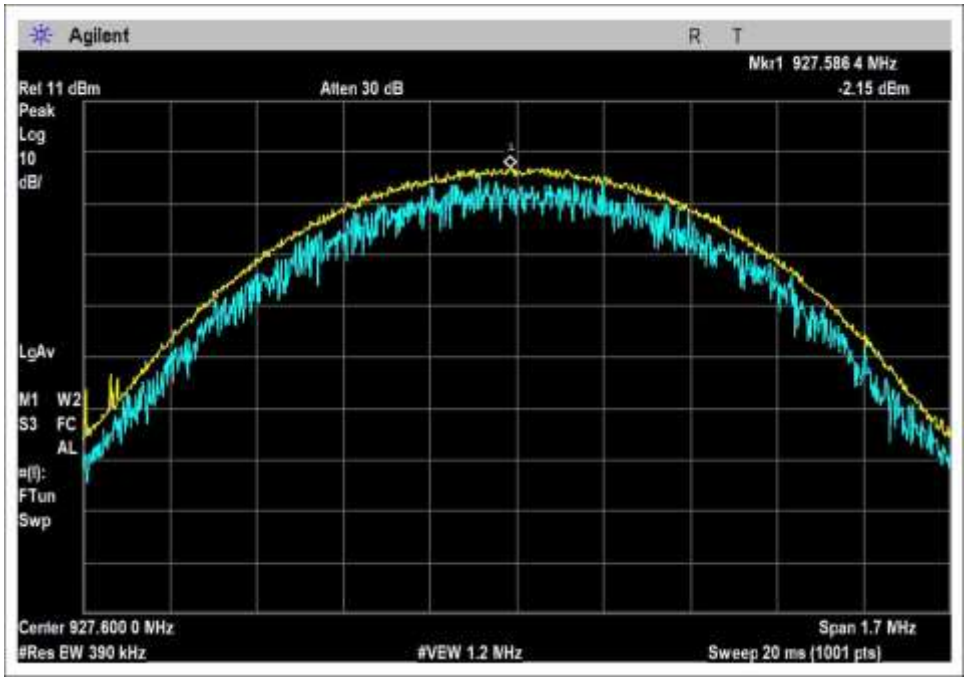
High Channel, 200k



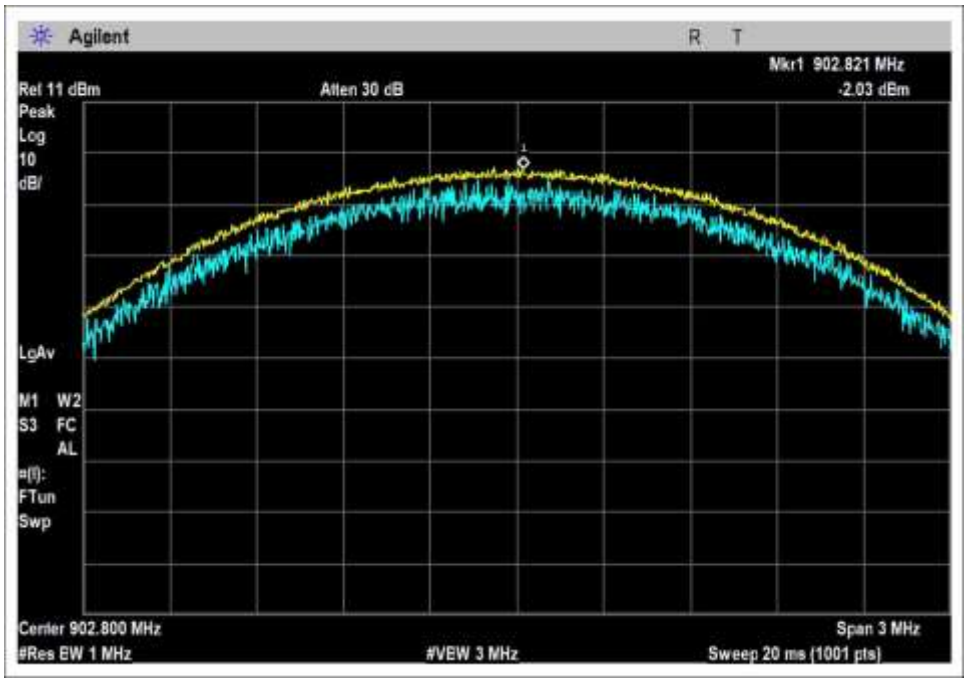
Low Channel, 600k



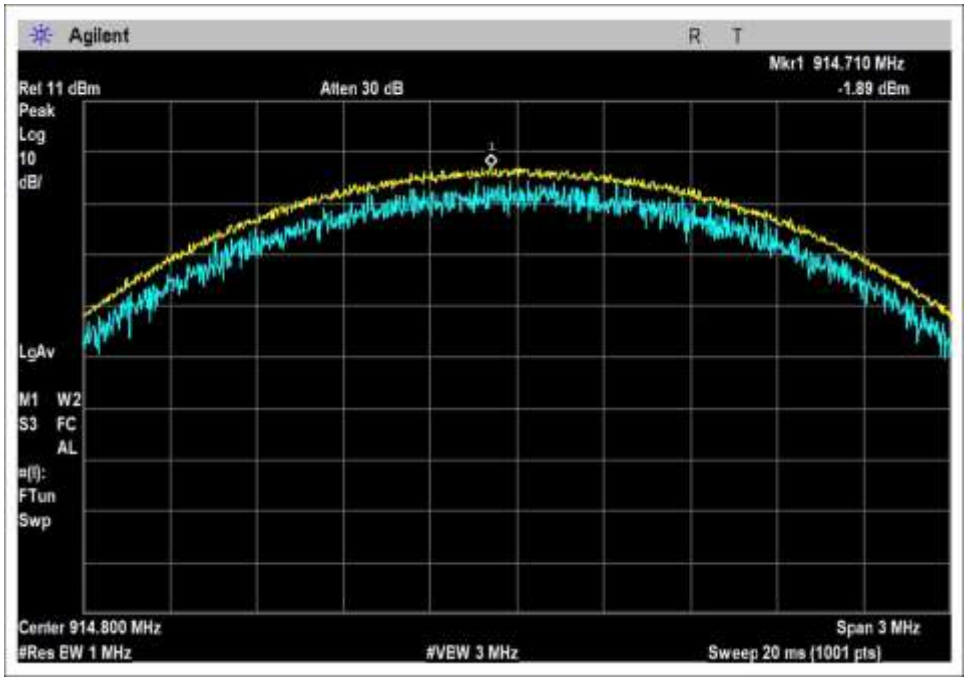
Middle Channel, 600k



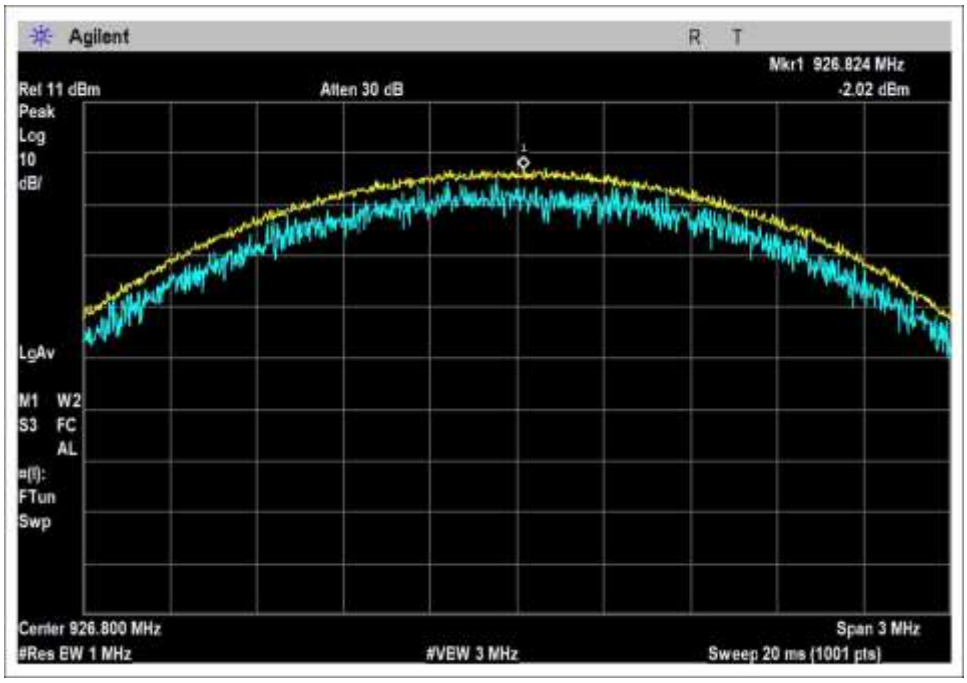
High Channel, 600k



Low Channel, 1.2M



Middle Channel, 1.2M



High Channel, 1.2M

Test Setup / Conditions / Data

Test Location:	CKC Laboratories • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Itron, Inc.**		
Specification:	**15.247(b) Power Output (902-928 MHz FHSS >50 Channels)**		
Work Order #:	**101674**	Date:	8/21/2018
Test Type:	**Conducted Emissions**	Time:	10:17:53
Tested By:	Michael Atkinson	Sequence#:	1
Software:	EMITest 5.03.11		115VAC 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Frequency Range: Fundamental
Frequency tested: Low, Mid, High Channels
Firmware power setting: Max
Firmware: CAM3-DEV Major Number 4, Minor Number 7, Build Number 153, Revision Number 787268
Test Software: CAM3 FCC Test Helper v14

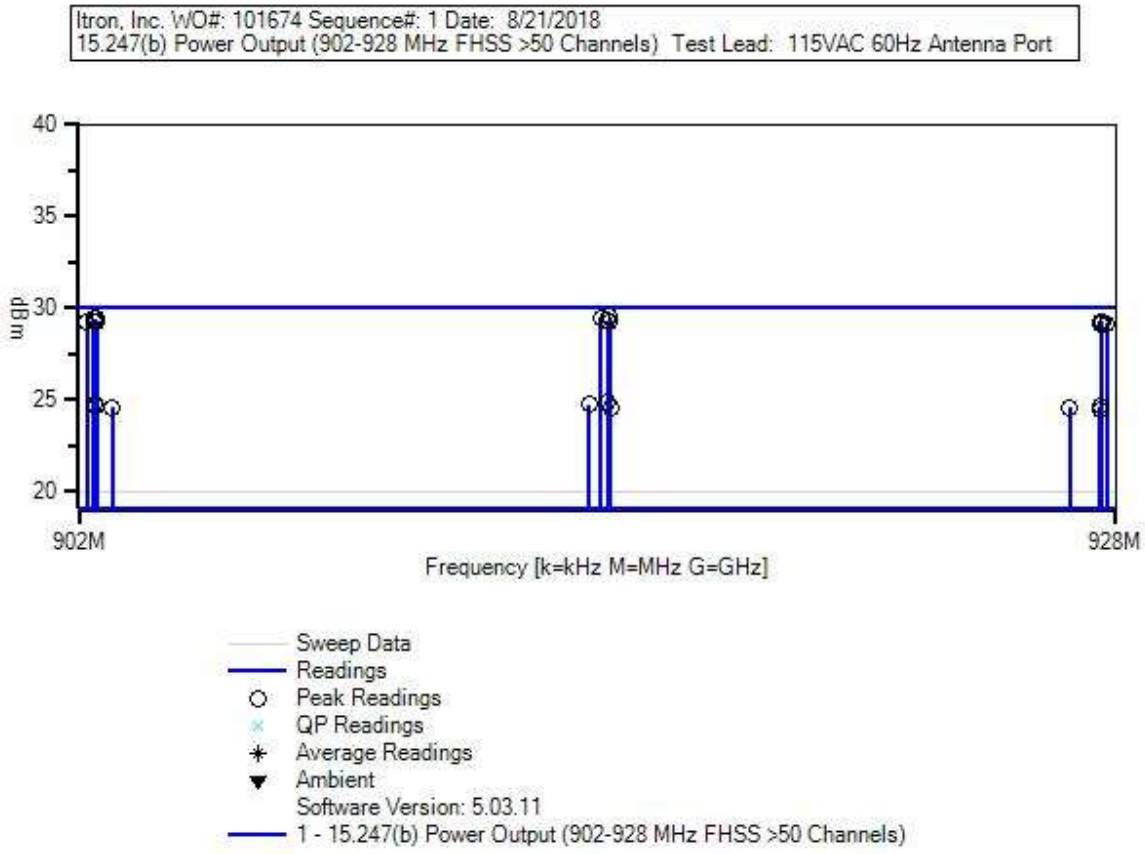
Modulation Types:
10k GFSK, 50k GFSK, 150k GFSK
6.25k OQPSK, 12.5k OQPSK
200k OFDM, 600k OFDM, 1.2M OFDM (Hybrid)

Antenna type: External Colinear Omni
Antenna Gain : 2.8dBi (attached), 5.5dBi (remote), 8.15dBi with 3dB attenuator (remote)

Duty Cycle: Tested at 100%

Test Location: Bothell Lab Bench
Test Method: ANSI C63.10 (2013)
Temperature (ºC): 22-24
Relative Humidity (%): 38-42

Setup: The EUT is continuously transmitting with modulation on ISM port.
The EUT ISM port is connected directly to a spectrum analyzer for direct conducted measurements.
Low, Mid, High channels investigated, all modulation types investigated
Also, investigated voltage variations based on manufacturer specified Vmin and Vmax.


Itron, Inc. WO#: 101674 Sequence#: 1 Date: 8/21/2018
15.247(b) Power Output (902-928 MHz FHSS >50 Channels) Test Lead: 115VAC 60Hz Antenna Port
40
35
30
25
20
dBm
902M
928M
Frequency [k=kHz M=MHz G=GHz]
Sweep Data
Readings
Peak Readings
QP Readings
Average Readings
Ambient
Software Version: 5.03.11
1 - 15.247(b) Power Output (902-928 MHz FHSS >50 Channels)

Test Equipment:

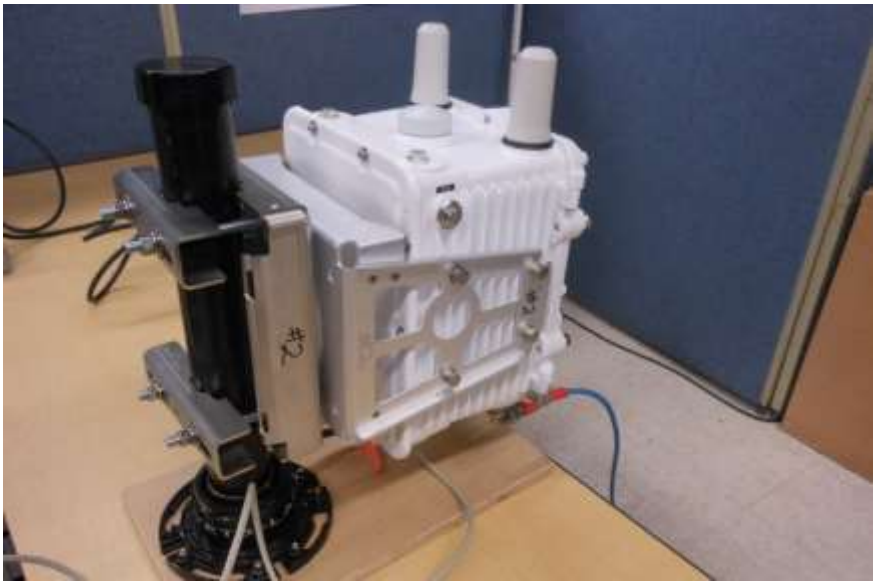
ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/3/2017	2/3/2019
T1	ANP07228	Attenuator	PE7004-20	11/30/2017	11/30/2019
T2	ANP07226	Attenuator	PE7004-6	12/1/2017	12/1/2019
T3	ANP06008	Cable	Heliax	4/10/2018	4/10/2020

Measurement Data: Reading listed by margin. Test Lead: Antenna Port

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBm	Spec dBm	Margin dB	Polar Ant
1	915.224M	2.9	+20.0	+5.8	+0.8		+0.0	29.5	30.0 6.25k OQPSK	-0.5	Anten
2	915.223M	2.9	+20.0	+5.8	+0.8		+0.0	29.5	30.0 12.5 OQPSK	-0.5	Anten
3	915.005M	2.8	+20.0	+5.8	+0.8		+0.0	29.4	30.0 10k GFSK	-0.6	Anten
4	902.421M	2.8	+20.0	+5.8	+0.8		+0.0	29.4	30.0 12.5 OQPSK	-0.6	Anten
5	902.374M	2.8	+20.0	+5.8	+0.8		+0.0	29.4	30.0 6.25k OQPSK	-0.6	Anten
6	915.161M	2.7	+20.0	+5.8	+0.8		+0.0	29.3	30.0 150k GFSK	-0.7	Anten
7	902.439M	2.7	+20.0	+5.8	+0.8		+0.0	29.3	30.0 150k GFSK	-0.7	Anten
8	927.620M	2.7	+20.0	+5.8	+0.8		+0.0	29.3	30.0 12.5 OQPSK	-0.7	Anten
9	902.195M	2.7	+20.0	+5.8	+0.8		+0.0	29.3	30.0 10k GFSK	-0.7	Anten
10	915.225M	2.6	+20.0	+5.8	+0.8		+0.0	29.2	30.0 50k GFSK	-0.8	Anten
11	927.620M	2.6	+20.0	+5.8	+0.8		+0.0	29.2	30.0 6.25k OQPSK	-0.8	Anten
12	902.378M	2.6	+20.0	+5.8	+0.8		+0.0	29.2	30.0 50k GFSK	-0.8	Anten
13	927.632M	2.6	+20.0	+5.8	+0.8		+0.0	29.2	30.0 150k GFSK	-0.8	Anten
14	927.755M	2.6	+20.0	+5.8	+0.8		+0.0	29.2	30.0 10k GFSK	-0.8	Anten
15	927.624M	2.5	+20.0	+5.8	+0.8		+0.0	29.1	30.0 50k GFSK	-0.9	Anten
16	915.169M	-1.8	+20.0	+5.8	+0.8		+0.0	24.8	30.0 200k OFDM	-5.2	Anten
17	902.400M	-1.8	+20.0	+5.8	+0.8		+0.0	24.8	30.0 200k OFDM	-5.2	Anten

18	914.710M	-1.9	+20.0	+5.8	+0.8	+0.0	24.7	30.0 1.2M OFDM	-5.3	Anten
19	927.600M	-2.0	+20.0	+5.8	+0.8	+0.0	24.6	30.0 200k OFDM	-5.4	Anten
20	902.441M	-2.0	+20.0	+5.8	+0.8	+0.0	24.6	30.0 600k OFDM	-5.4	Anten
21	926.824M	-2.0	+20.0	+5.8	+0.8	+0.0	24.6	30.0 1.2M OFDM	-5.4	Anten
22	902.821M	-2.0	+20.0	+5.8	+0.8	+0.0	24.6	30.0 1.2M OFDM	-5.4	Anten
23	915.226M	-2.1	+20.0	+5.8	+0.8	+0.0	24.5	30.0 600k OFDM	-5.5	Anten
24	927.586M	-2.2	+20.0	+5.8	+0.8	+0.0	24.5	30.0 600k OFDM	-5.5	Anten

Test Setup Photo



15.247(d) RF Conducted Emissions & Band Edge

Test Setup / Conditions / Data

Test Location:	CKC Laboratories • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**101674**	Date:	8/29/2018
Test Type:	**Conducted Emissions**	Time:	09:14:02
Tested By:	Michael Atkinson	Sequence#:	6
Software:	EMITest 5.03.11		115VAC 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Frequency Range: 9kHz-9.28GHz
Frequency tested: Low, Mid, and High Channels
Firmware power setting: Max
Firmware: CAM3-DEV Major Number 4, Minor Number 7, Build Number 153, Revision Number 787268
Test Software: CAM3 FCC Test Helper v14

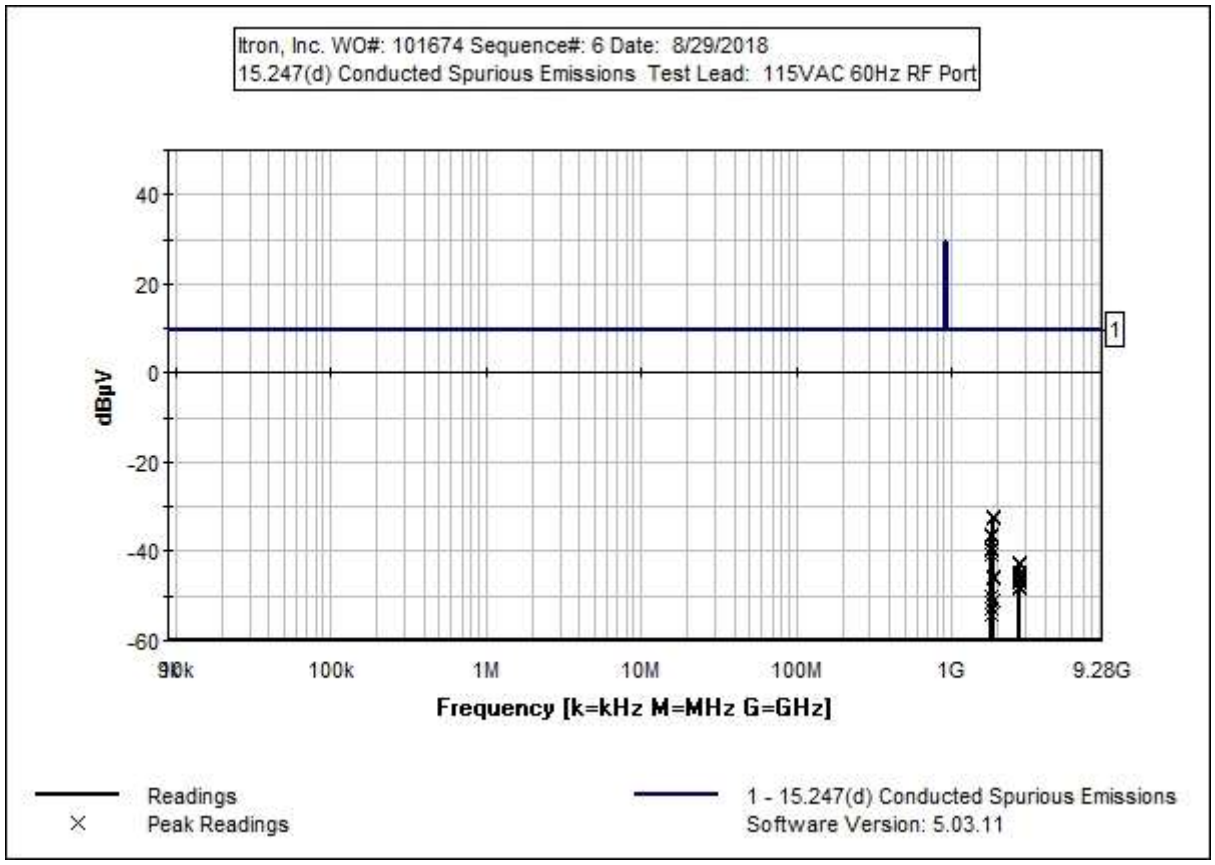
Modulation Types:
10k GFSK, 50k GFSK, 150k GFSK
6.25k OQPSK, 12.5k OQPSK
200k OFDM, 600k OFDM, 1.2M OFDM (Hybrid)
Hopping modes: 10k GFSK, 6.25k OQPSK, 200k OFDM, 1.2M OFDM.

Antenna type: External Colinear Omni
Antenna Gain : 2.8dBi (attached), 5.5dBi (remote), 8.15dBi with 3dB attenuator (remote)

Duty Cycle: Tested at 100%

Test Location: Bothell Lab Bench
Test Method: ANSI C63.10 (2013)
Temperature (ºC): 22-24
Relative Humidity (%): 38-42

Setup: The EUT is continuously transmitting with modulation on ISM port.
The EUT ISM port is connected directly to a spectrum analyzer for direct conducted measurements.
Low, Mid, High channels investigated, all modulation types investigated


Itron, Inc. WO#: 101674 Sequence#: 6 Date: 8/29/2018
15.247(d) Conducted Spurious Emissions Test Lead: 115VAC 60Hz RF Port
40
20
0
-20
-40
-60
dBµV
100k
1M
10M
100M
1G
9.28G
Frequency [k=kHz M=MHz G=GHz]
1
Readings
Peak Readings
1 - 15.247(d) Conducted Spurious Emissions
Software Version: 5.03.11

Test Equipment:

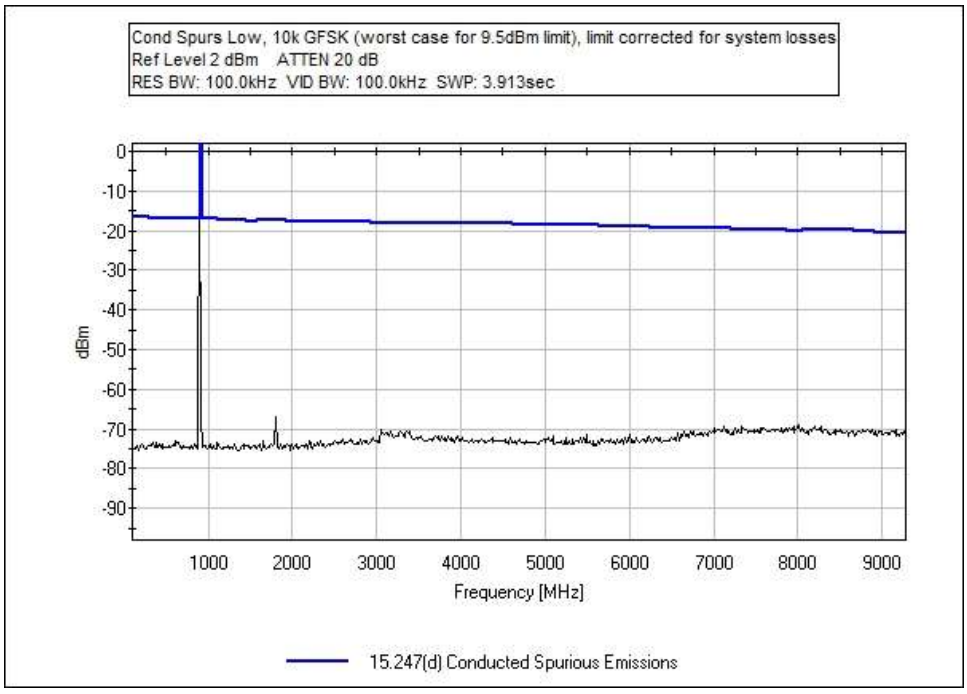
ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02673	Spectrum Analyzer	E4446A	2/3/2017	2/3/2019
T2	ANP07228	Attenuator	PE7004-20	11/30/2017	11/30/2019
T3	ANP07226	Attenuator	PE7004-6	12/1/2017	12/1/2019
T4	ANP06008	Cable	Heliax	4/10/2018	4/10/2020

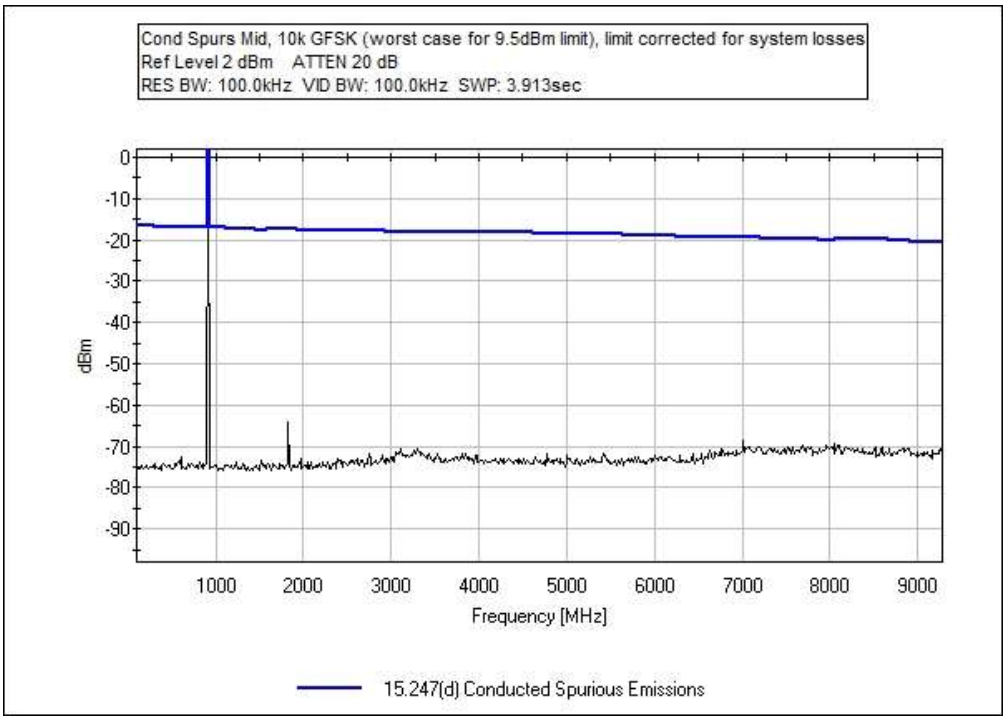
Measurement Data: Reading listed by margin. Test Lead: RF Port

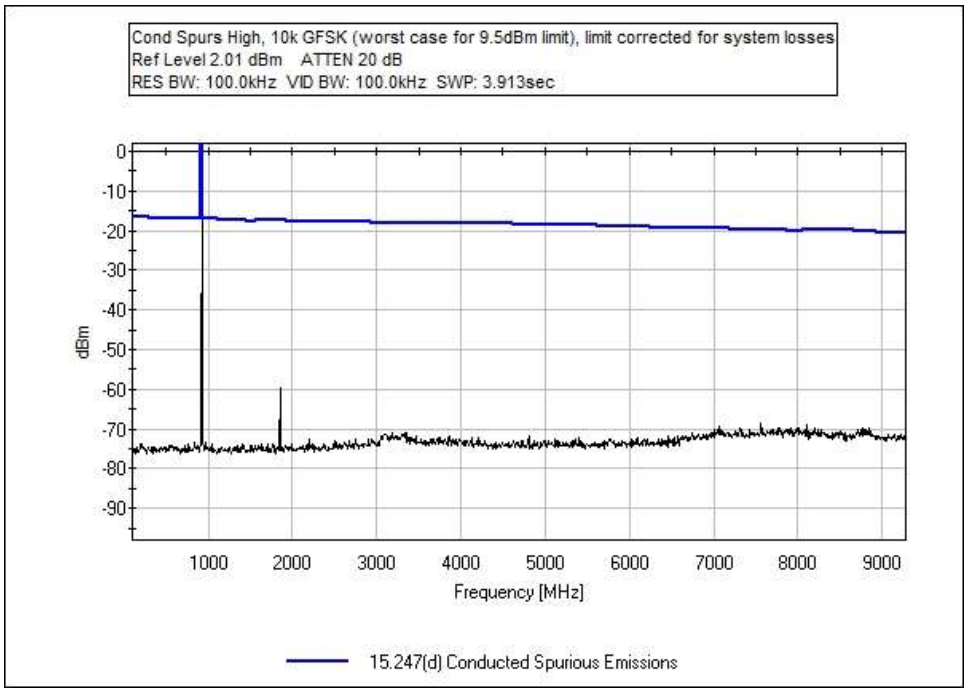
#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	1855.260M	-59.0	+0.0	+20.0	+5.9	+1.1	+0.0	-32.0	9.5 6.25k OQPSK	-41.5	RF Po
2	1855.505M	-59.0	+0.0	+20.0	+5.9	+1.1	+0.0	-32.0	9.5 10k GFSK	-41.5	RF Po
3	1855.200M	-59.3	+0.0	+20.0	+5.9	+1.1	+0.0	-32.3	9.5 50k GFSK	-41.8	RF Po
4	1855.250M	-59.4	+0.0	+20.0	+5.9	+1.1	+0.0	-32.4	9.5 150k GFSK	-41.9	RF Po
5	1855.220M	-59.4	+0.0	+20.0	+5.9	+1.1	+0.0	-32.4	9.5 12.5k OQPSK	-41.9	RF Po
6	1829.991M	-63.0	+0.0	+20.0	+5.9	+1.1	+0.0	-36.0	9.5 10k GFSK	-45.5	RF Po
7	1830.445M	-63.0	+0.0	+20.0	+5.9	+1.1	+0.0	-36.0	9.5 6.25k OQPSK	-45.5	RF Po
8	1830.415M	-63.3	+0.0	+20.0	+5.9	+1.1	+0.0	-36.3	9.5 50k GFSK	-45.8	RF Po
9	1830.455M	-63.7	+0.0	+20.0	+5.9	+1.1	+0.0	-36.7	9.5 150k GFSK	-46.2	RF Po
10	1830.415M	-63.8	+0.0	+20.0	+5.9	+1.1	+0.0	-36.8	9.5 12.5k OQPSK	-46.3	RF Po
11	1855.205M	-72.7	+0.0	+20.0	+5.9	+1.1	+0.0	-45.7	1.0 200k OFDM	-46.7	RF Po
12	1855.250M	-73.2	+0.0	+20.0	+5.9	+1.1	+0.0	-46.2	1.0 600k OFDM	-47.2	RF Po
13	1804.770M	-66.4	+0.0	+20.0	+5.9	+1.0	+0.0	-39.5	9.5 12.5k OQPSK	-49.0	RF Po
14	1804.417M	-66.4	+0.0	+20.0	+5.9	+1.0	+0.0	-39.5	9.5 10k GFSK	-49.0	RF Po
15	1804.845M	-66.5	+0.0	+20.0	+5.9	+1.0	+0.0	-39.6	9.5 6.25k OQPSK	-49.1	RF Po
16	1804.810M	-66.8	+0.0	+20.0	+5.9	+1.0	+0.0	-39.9	9.5 50k GFSK	-49.4	RF Po
17	1804.815M	-67.8	+0.0	+20.0	+5.9	+1.0	+0.0	-40.9	9.5 150k GFSK	-50.4	RF Po
18	1830.385M	-76.9	+0.0	+20.0	+5.9	+1.1	+0.0	-49.9	1.0 200k OFDM	-50.9	RF Po
19	1830.435M	-77.0	+0.0	+20.0	+5.9	+1.1	+0.0	-50.0	1.0 600k OFDM	-51.0	RF Po
20	1804.790M	-77.2	+0.0	+20.0	+5.9	+1.0	+0.0	-50.3	1.0 200k OFDM	-51.3	RF Po

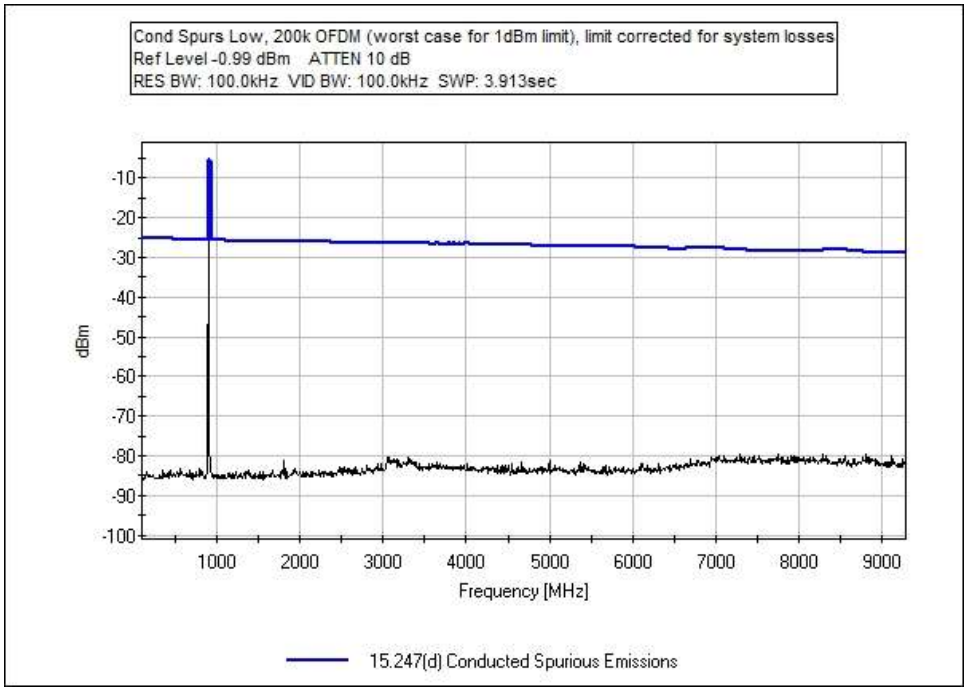
21	1853.635M	-78.1	+0.0	+20.0	+5.9	+1.1	+0.0	-51.1	1.0 1.2M OFDM	-52.1	RF Po
22	2745.000M	-70.0	+0.0	+20.0	+5.8	+1.5	+0.0	-42.7	9.5 10k GFSK	-52.2	RF Po
23	2745.665M	-70.1	+0.0	+20.0	+5.8	+1.5	+0.0	-42.8	9.5 6.25k OQPSK	-52.3	RF Po
24	1804.805M	-78.3	+0.0	+20.0	+5.9	+1.0	+0.0	-51.4	1.0 600k OFDM	-52.4	RF Po
25	1805.535M	-79.8	+0.0	+20.0	+5.9	+1.0	+0.0	-52.9	1.0 1.2M OFDM	-53.9	RF Po
26	2745.660M	-72.0	+0.0	+20.0	+5.8	+1.5	+0.0	-44.7	9.5 12.5k OQPSK	-54.2	RF Po
27	2745.640M	-72.1	+0.0	+20.0	+5.8	+1.5	+0.0	-44.8	9.5 50k GFSK	-54.3	RF Po
28	2783.245M	-72.4	+0.0	+20.0	+5.8	+1.5	+0.0	-45.1	9.5 10k GFSK	-54.6	RF Po
29	2782.685M	-72.4	+0.0	+20.0	+5.8	+1.5	+0.0	-45.1	9.5 50k GFSK	-54.6	RF Po
30	2745.610M	-72.9	+0.0	+20.0	+5.8	+1.5	+0.0	-45.6	9.5 150k GFSK	-55.1	RF Po
31	1829.640M	-81.2	+0.0	+20.0	+5.9	+1.1	+0.0	-54.2	1.0 1.2M OFDM	-55.2	RF Po
32	2707.210M	-73.3	+0.0	+20.0	+5.8	+1.5	+0.0	-46.0	9.5 50k GFSK	-55.5	RF Po
33	2782.850M	-73.9	+0.0	+20.0	+5.8	+1.5	+0.0	-46.6	9.5 150k GFSK	-56.1	RF Po
34	2706.617M	-74.4	+0.0	+20.0	+5.8	+1.5	+0.0	-47.1	9.5 10k GFSK	-56.6	RF Po
35	2782.860M	-74.5	+0.0	+20.0	+5.8	+1.5	+0.0	-47.2	9.5 6.25k OQPSK	-56.7	RF Po
36	2707.170M	-75.0	+0.0	+20.0	+5.8	+1.5	+0.0	-47.7	9.5 12.5k OQPSK	-57.2	RF Po
37	2707.245M	-75.4	+0.0	+20.0	+5.8	+1.5	+0.0	-48.1	9.5 6.25k OQPSK	-57.6	RF Po
38	2782.820M	-75.5	+0.0	+20.0	+5.8	+1.5	+0.0	-48.2	9.5 12.5k OQPSK	-57.7	RF Po
39	2707.215M	-75.8	+0.0	+20.0	+5.8	+1.5	+0.0	-48.5	9.5 150k GFSK	-58.0	RF Po

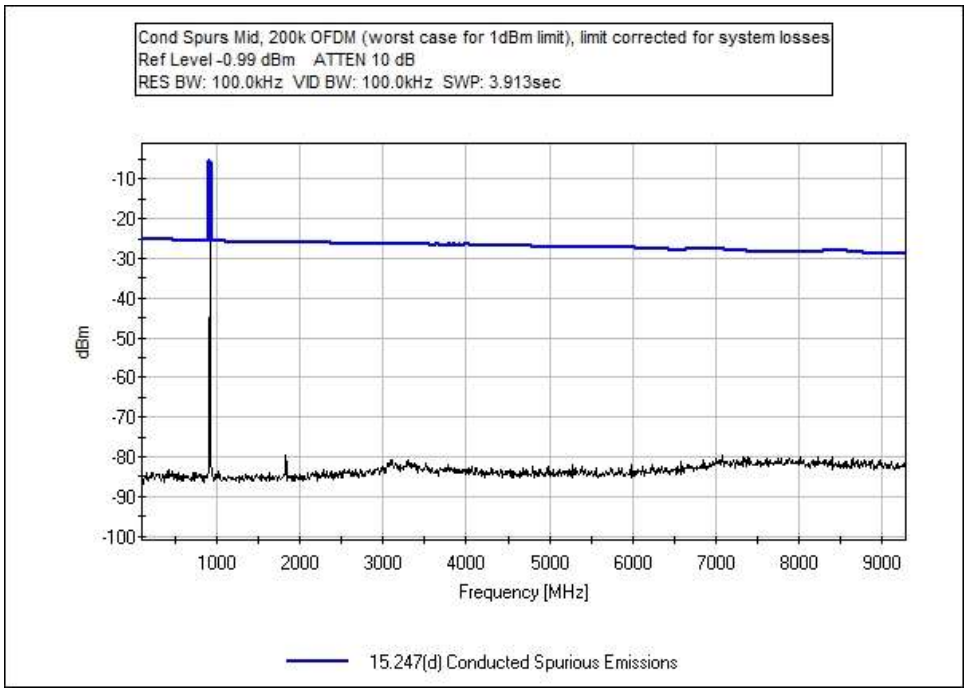
Plots

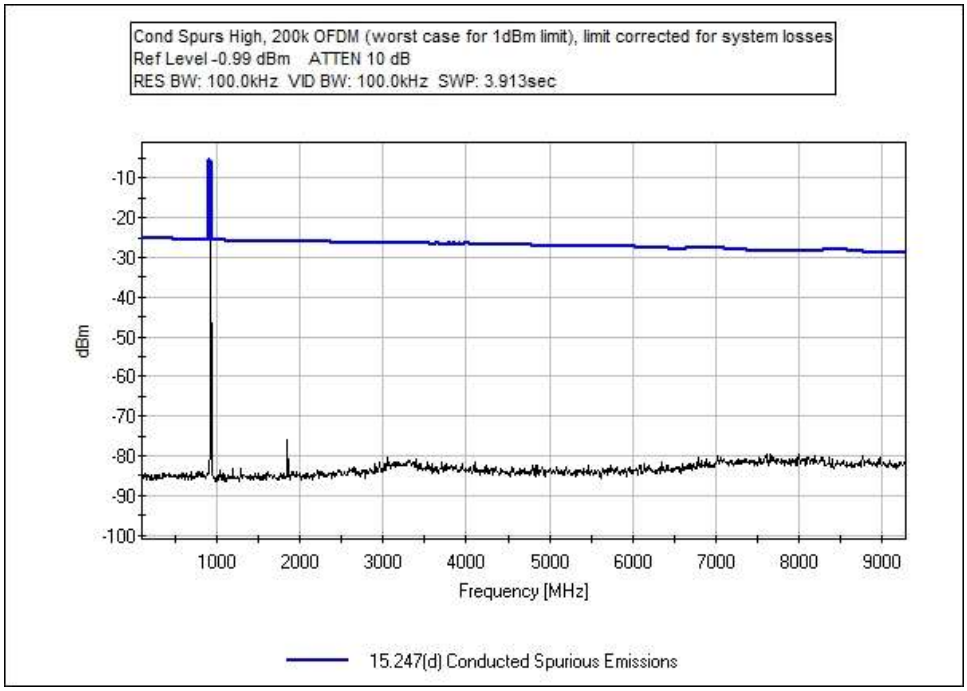

Cond Spurs Low, 10k GFSK (worst case for 9.5dBm limit), limit corrected for system losses
Ref Level 2 dBm ATTEN 20 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 3.913sec
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
dBm
1000
2000
3000
4000
5000
6000
7000
8000
9000
Frequency [MHz]
15.247(d) Conducted Spurious Emissions


Cond Spurs Mid, 10k GFSK (worst case for 9.5dBm limit), limit corrected for system losses
Ref Level 2 dBm ATTEN 20 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 3.913sec
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
dBm
1000
2000
3000
4000
5000
6000
7000
8000
9000
Frequency [MHz]
15.247(d) Conducted Spurious Emissions


Cond Spurs High, 10k GFSK (worst case for 9.5dBm limit), limit corrected for system losses
Ref Level 2.01 dBm ATTEN 20 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 3.913sec
dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
1000
2000
3000
4000
5000
6000
7000
8000
9000
Frequency [MHz]
15.247(d) Conducted Spurious Emissions


Cond Spurs Low, 200k OFDM (worst case for 1dBm limit), limit corrected for system losses
Ref Level -0.99 dBm ATTEN 10 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 3.913sec
dBm
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
1000
2000
3000
4000
5000
6000
7000
8000
9000
Frequency [MHz]
15.247(d) Conducted Spurious Emissions


Cond Spurs Mid, 200k OFDM (worst case for 1dBm limit), limit corrected for system losses
Ref Level -0.99 dBm ATTEN 10 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 3.913sec
dBm
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
1000
2000
3000
4000
5000
6000
7000
8000
9000
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

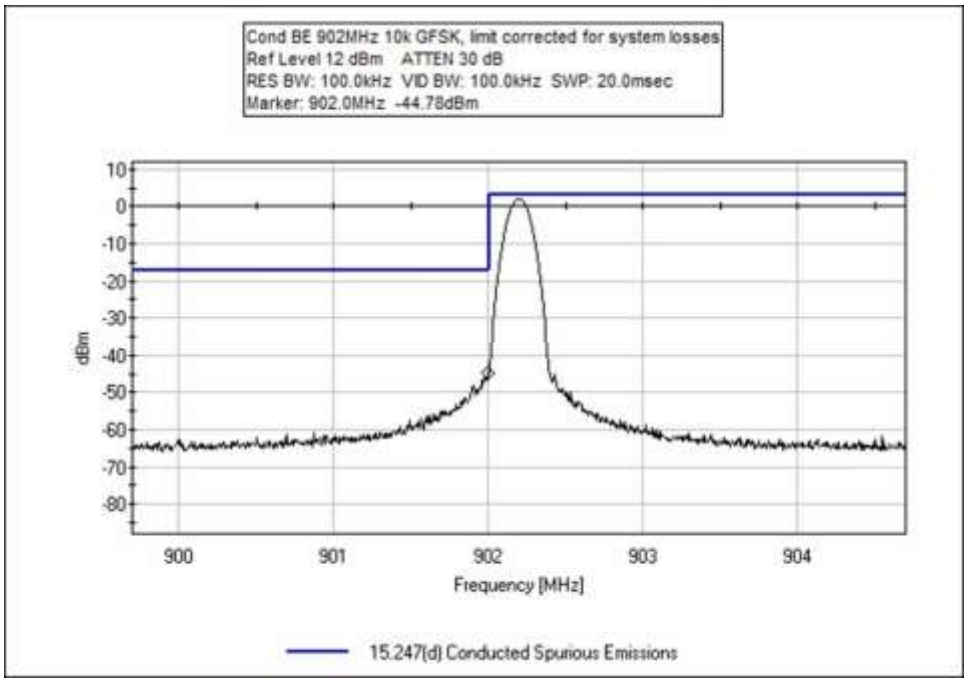

Cond Spurs High, 200k OFDM (worst case for 1dBm limit), limit corrected for system losses
Ref Level -0.99 dBm ATTEN 10 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 3.913sec
dBm
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
1000
2000
3000
4000
5000
6000
7000
8000
9000
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

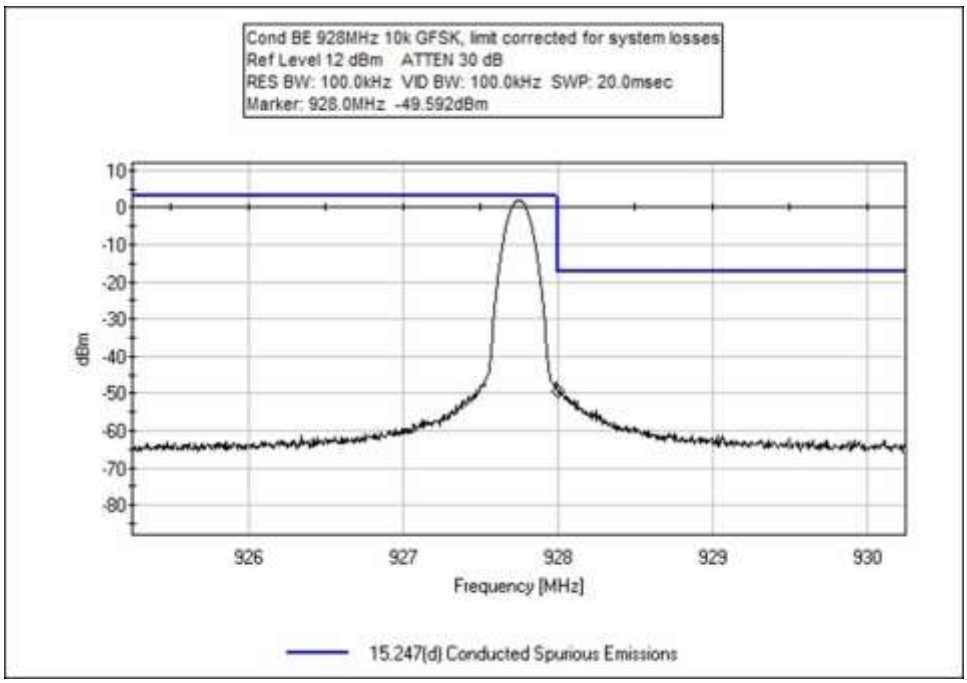
Band Edge

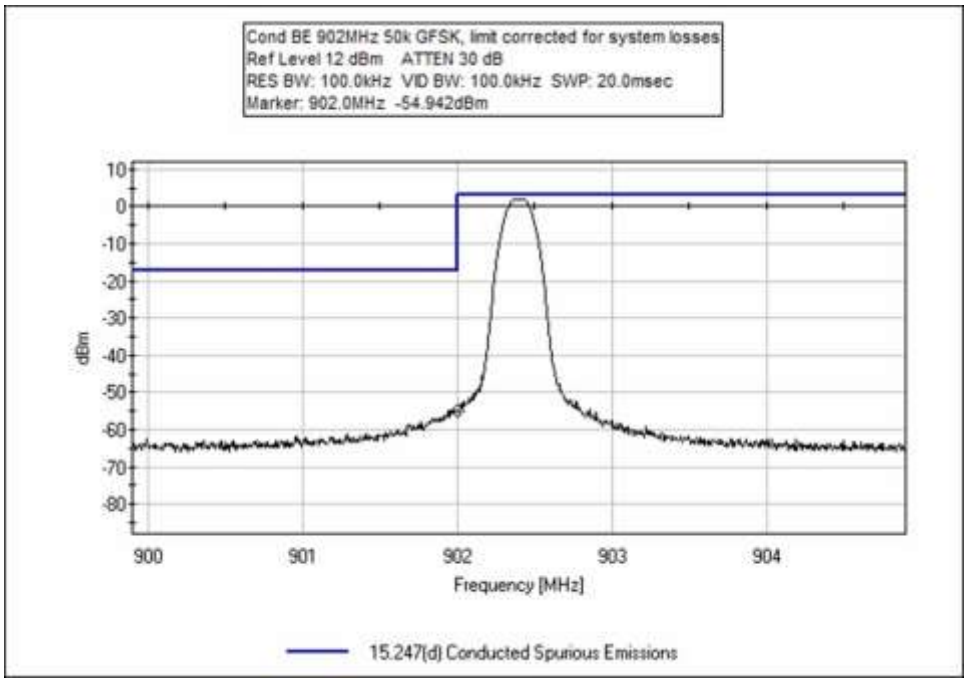
Band Edge Summary				
Limit applied: Max Power/100kHz - 20dB.				
Frequency (MHz)	**Modulation**	**Measured (dBm)**	**Limit (dBm)**	**Results**
902	10k GFSK	-18.2	<9.5	Pass
928	10k GFSK	-23.0	<9.5	Pass
902	50k GFSK	-27.8	<9.5	Pass
928	50k GFSK	-28.8	<9.5	Pass
902	150k GFSK	-27.9	<9.5	Pass
928	150k GFSK	-26.0	<9.5	Pass
902	6.25k OQPSK	-27.0	<9.5	Pass
928	6.25k OQPSK	-27.1	<9.5	Pass
902	12.5k OQPSK	-28.9	<9.5	Pass
928	12.5k OQPSK	-27.5	<9.5	Pass
902	200k OFDM	-27.1	<1.0	Pass
928	200k OFDM	-30.7	<1.0	Pass
902	600k OFDM	-27.3	<1.0	Pass
928	600k OFDM	-29.9	<1.0	Pass
902	1.2M OFDM	-28.3	<1.0	Pass
928	1.2M OFDM	-38.6	<1.0	Pass
902	Hopping (10k GFSK)	-15.2	<9.5	Pass
928	Hopping (10k GFSK)	-32.1	<9.5	Pass
902	Hopping (6.25k OQPSK)	-31.0	<9.5	Pass
928	Hopping (6.25k OQPSK)	-34.0	<9.5	Pass
902	Hopping (200k OFDM)	-30.8	<1.0	Pass
928	Hopping (200k OFDM)	-38.4	<1.0	Pass
902	Hopping (1.2M OFDM) (Hybrid)	-38.1	<1.0	Pass
928	Hopping (1.2M OFDM) (Hybrid)	-38.3	<1.0	Pass

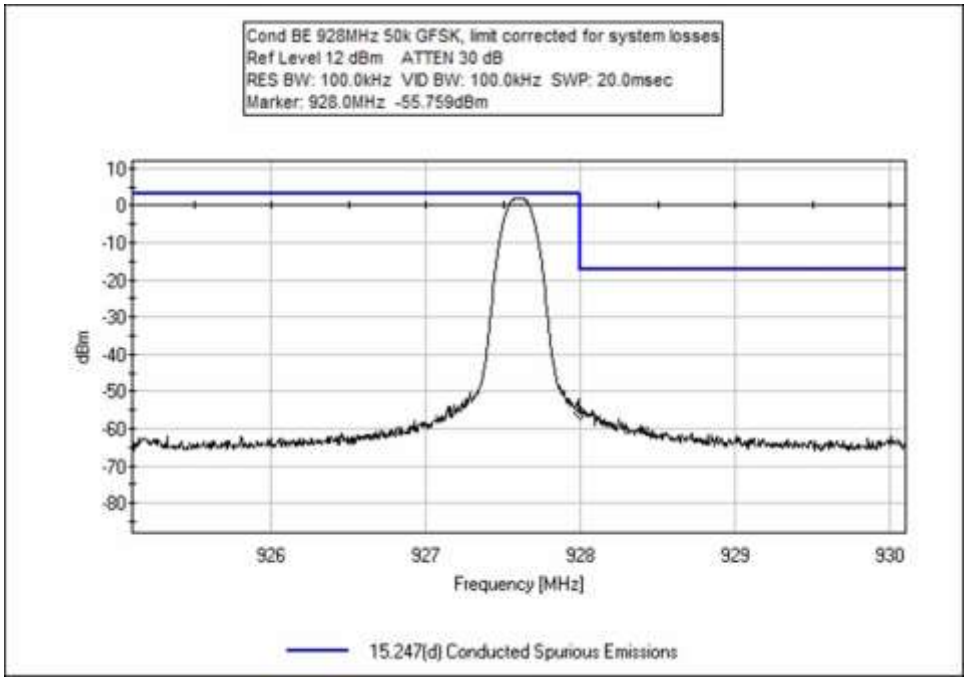
Band Edge Plots

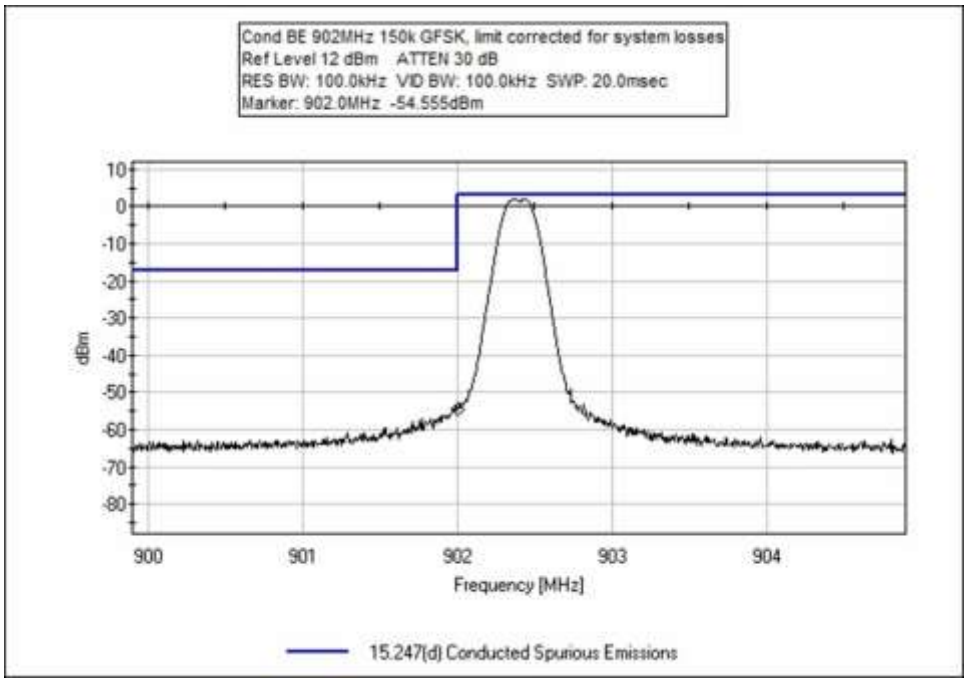
GFSK

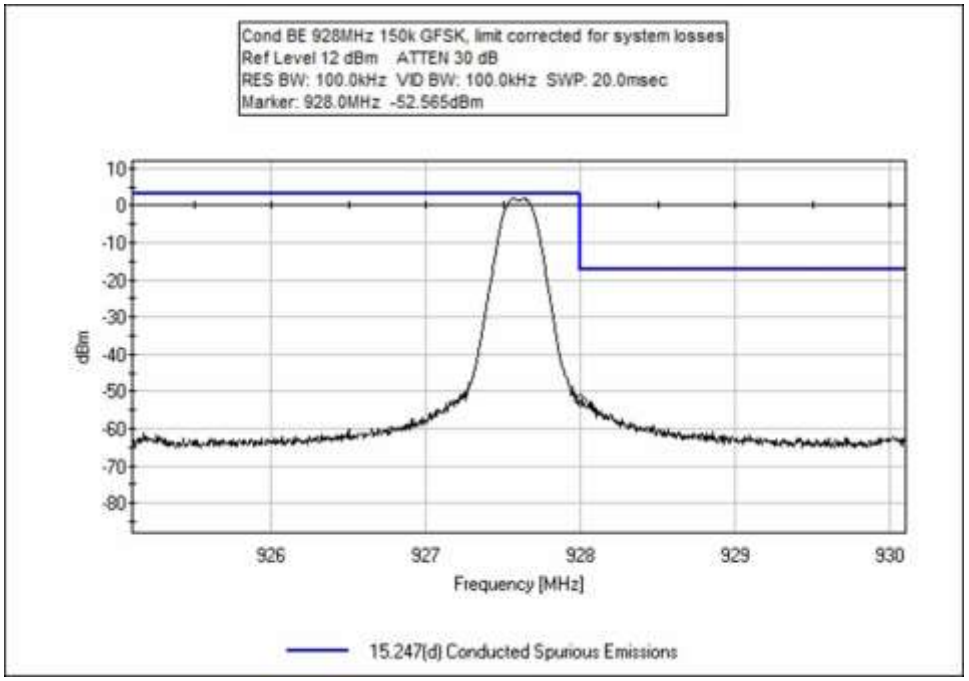




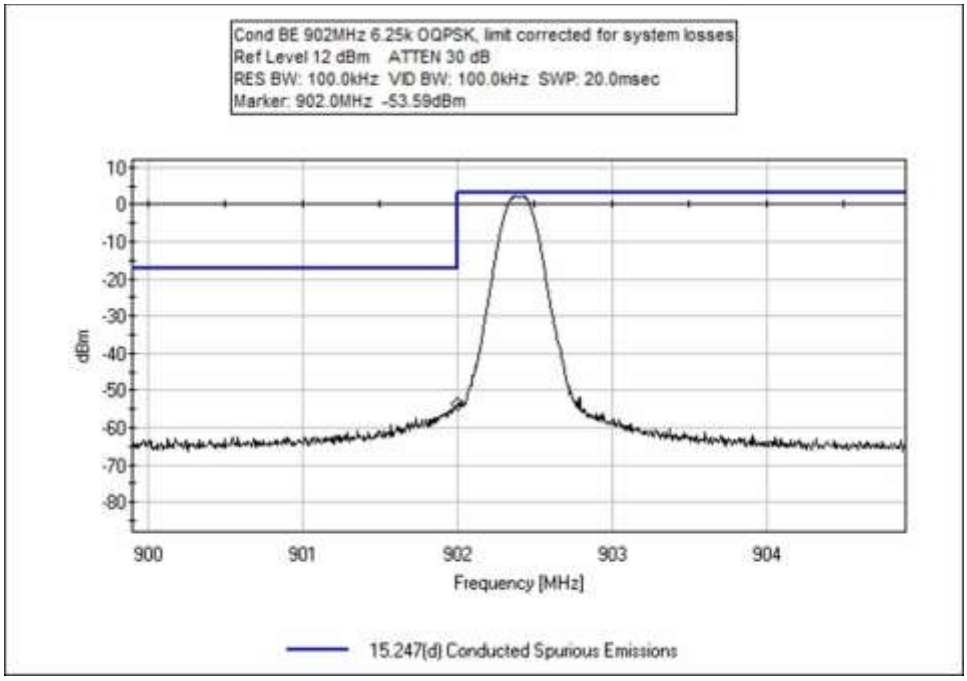

Cond BE 902MHz 50k GFSK, limit corrected for system losses
Ref Level 12 dBm ATTEN 30 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 20.0msec
Marker: 902.0MHz -54.942dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
dBm
900
901
902
903
904
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

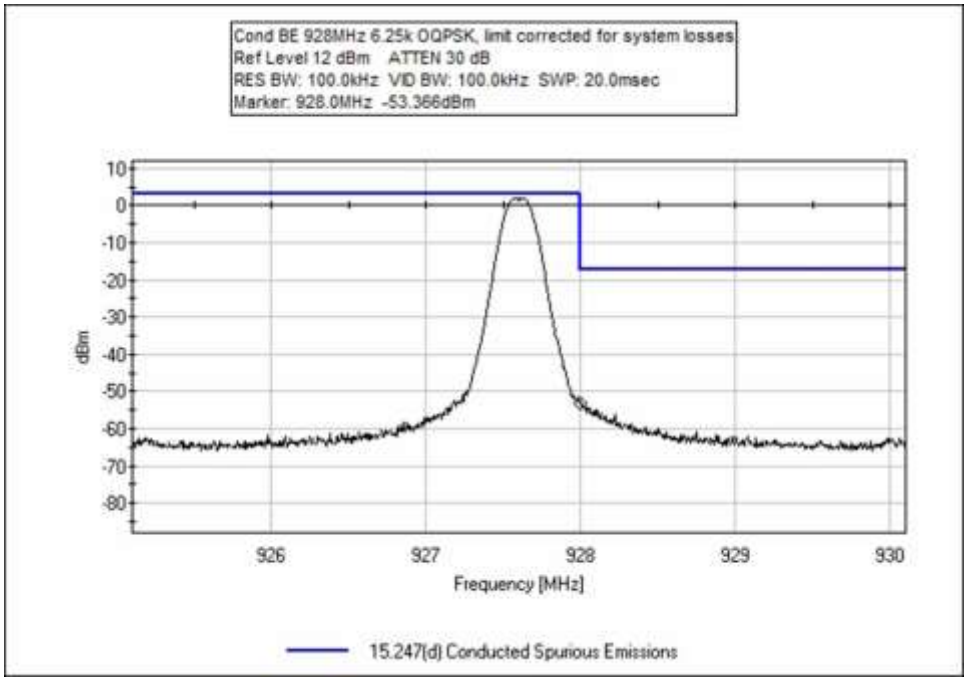

Cond BE 928MHz 50k GFSK, limit corrected for system losses
Ref Level 12 dBm ATTEN 30 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 20.0msec
Marker: 928.0MHz -55.759dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
dBm
926
927
928
929
930
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

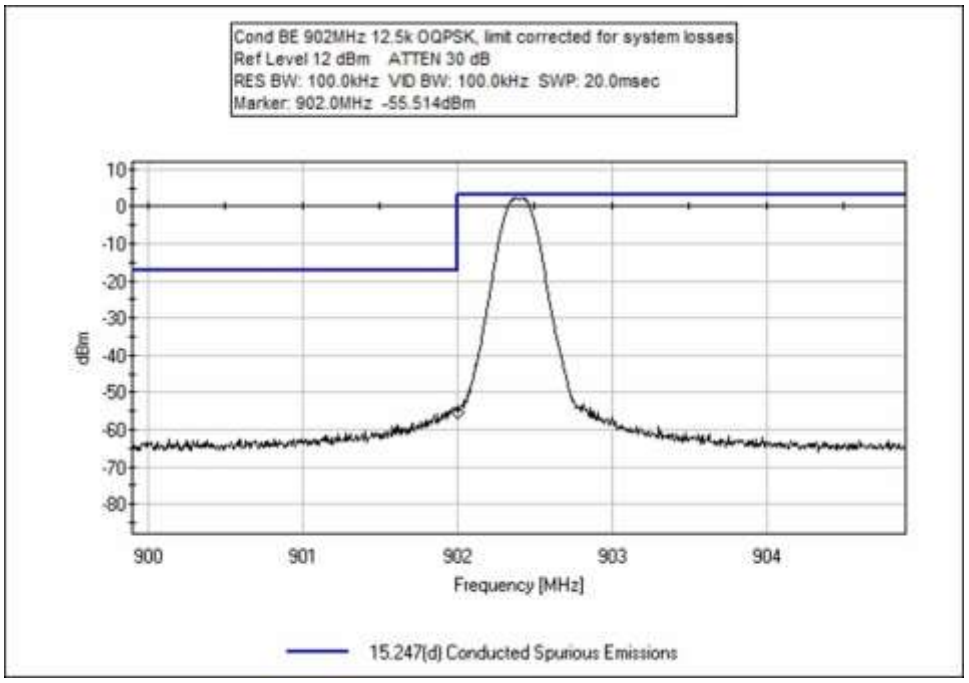

Cond BE 902MHz 150k GFSK, limit corrected for system losses
Ref Level 12 dBm ATTEN 30 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 20.0msec
Marker: 902.0MHz -54.555dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
dBm
900
901
902
903
904
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

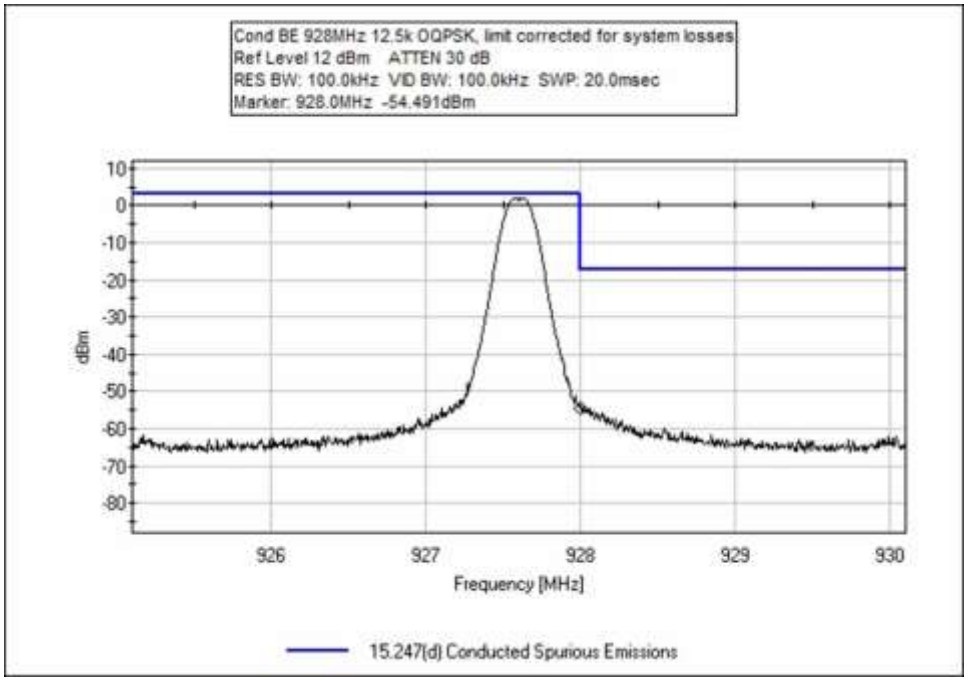

Cond BE 928MHz 150k GFSK, limit corrected for system losses
Ref Level 12 dBm ATTEN 30 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 20.0msec
Marker: 928.0MHz -52.565dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
dBm
926
927
928
929
930
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

OQPSK

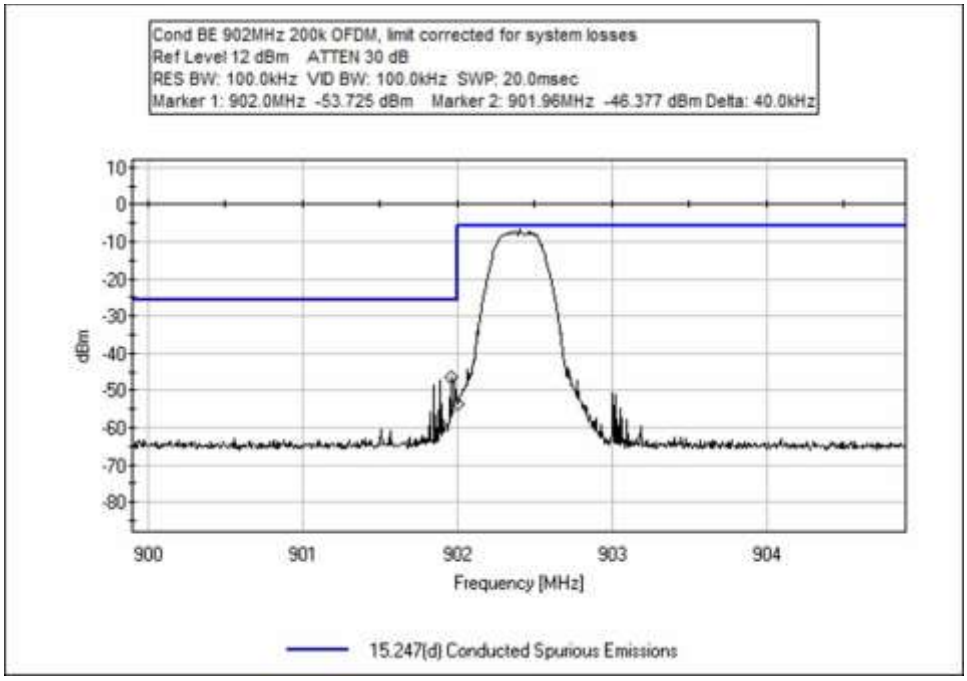

Cond BE 902MHz 6.25k OQPSK, limit corrected for system losses
Ref Level 12 dBm ATTEN 30 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 20.0msec
Marker: 902.0MHz -53.59dBm
dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
900
901
902
903
904
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

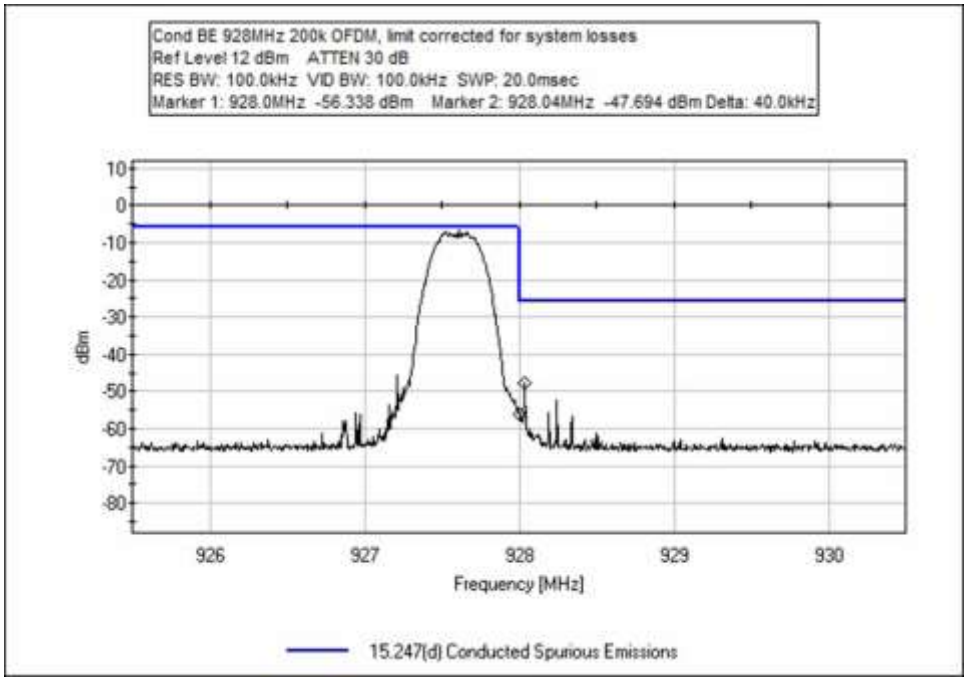

Cond BE 928MHz 6.25k OQPSK, limit corrected for system losses
Ref Level 12 dBm ATTEN 30 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 20.0msec
Marker: 928.0MHz -53.366dBm
dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
926
927
928
929
930
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

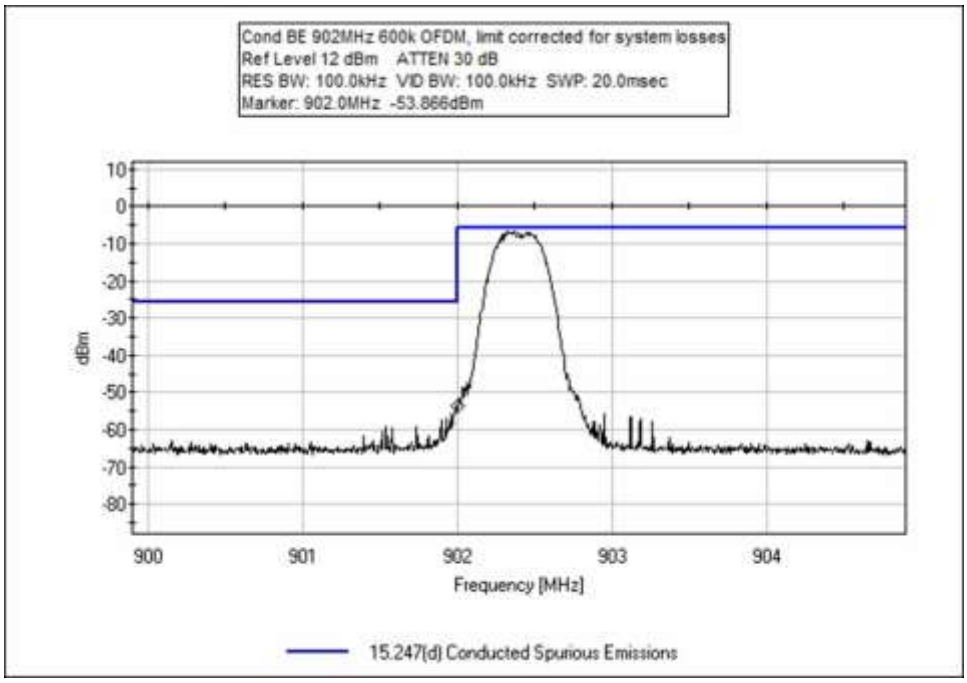

Cond BE 902MHz 12.5k OQPSK, limit corrected for system losses
Ref Level 12 dBm ATTEN 30 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 20.0msec
Marker: 902.0MHz -55.514dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
dBm
900
901
902
903
904
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

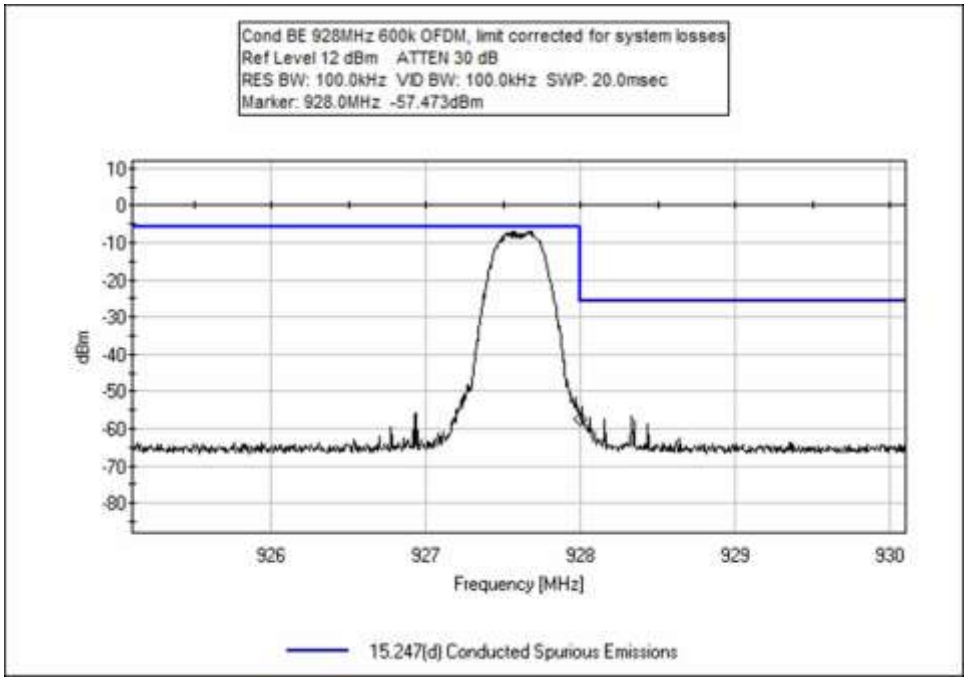

Cond BE 928MHz 12.5k OQPSK, limit corrected for system losses
Ref Level 12 dBm ATTEN 30 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 20.0msec
Marker: 928.0MHz -54.491dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
dBm
926
927
928
929
930
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

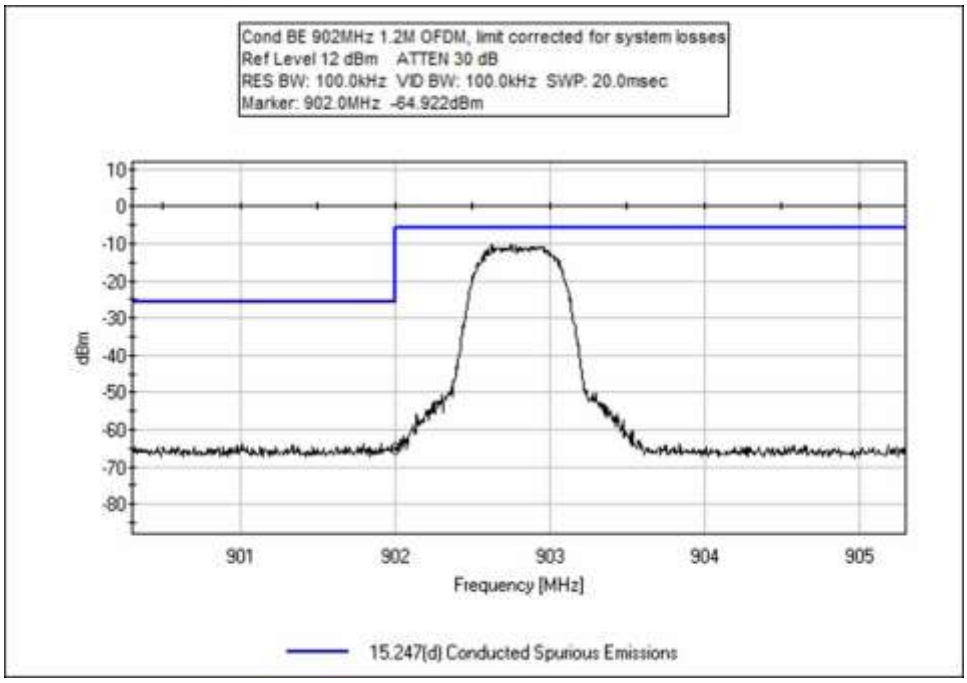
OFDM

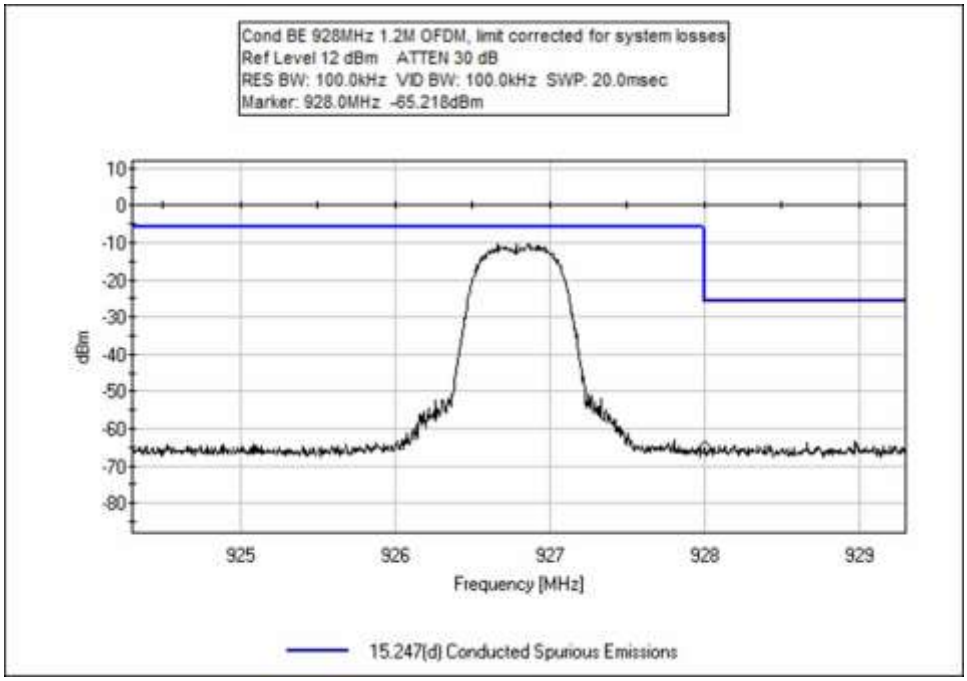

Cond BE 902MHz 200k OFDM, limit corrected for system losses
Ref Level 12 dBm ATTEN 30 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 20.0msec
Marker 1: 902.0MHz -53.725 dBm Marker 2: 901.96MHz -46.377 dBm Delta: 40.0kHz
10
0
-10
-20
-30
-40
-50
-60
-70
-80
dBm
900
901
902
903
904
Frequency [MHz]
15.247(d) Conducted Spurious Emissions


Cond BE 928MHz 200k OFDM, limit corrected for system losses
Ref Level 12 dBm ATTEN 30 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 20.0msec
Marker 1: 928.0MHz -56.338 dBm Marker 2: 928.04MHz -47.694 dBm Delta: 40.0kHz
10
0
-10
-20
-30
-40
-50
-60
-70
-80
dBm
926
927
928
929
930
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

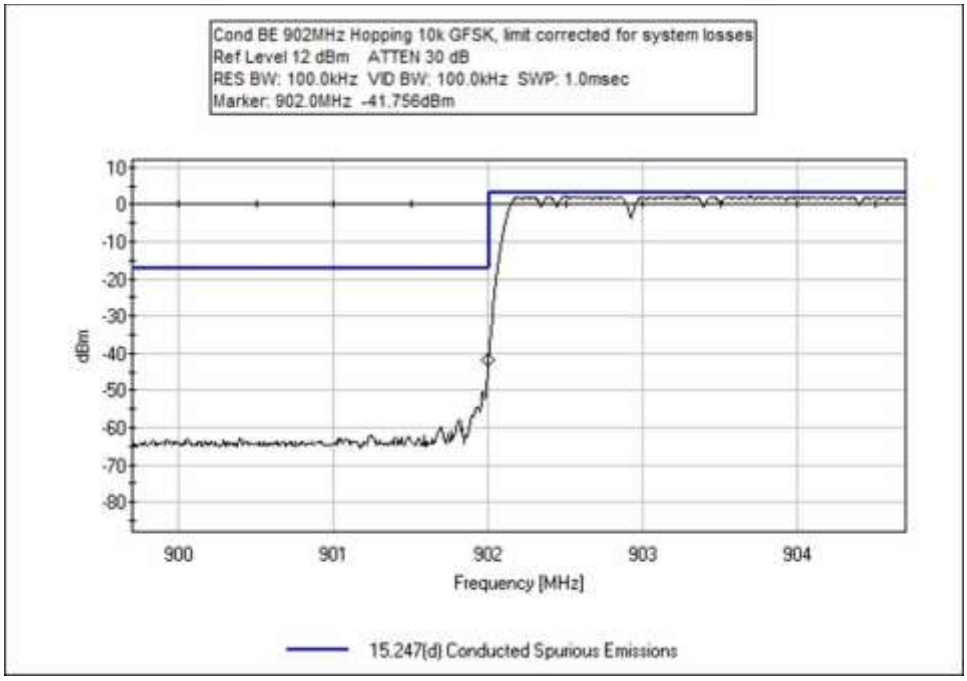

Cond BE 902MHz 600k OFDM, limit corrected for system losses
Ref Level 12 dBm ATTEN 30 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 20.0msec
Marker: 902.0MHz -53.866dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
dBm
900
901
902
903
904
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

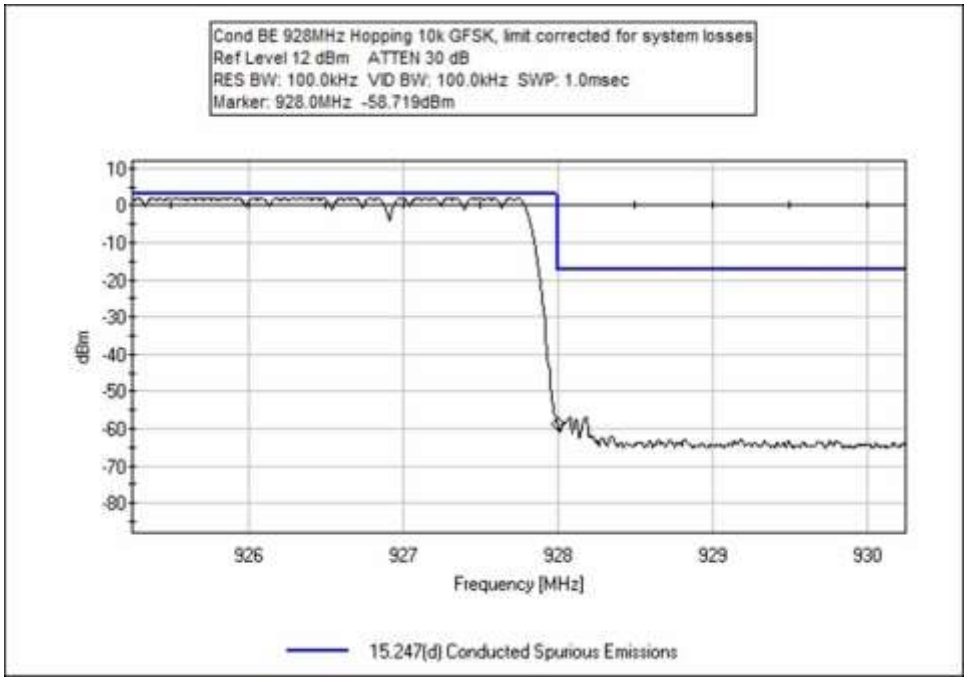

Cond BE 928MHz 600k OFDM, limit corrected for system losses
Ref Level 12 dBm ATTEN 30 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 20.0msec
Marker: 928.0MHz -57.473dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
dBm
926
927
928
929
930
Frequency [MHz]
15.247(d) Conducted Spurious Emissions


Cond BE 902MHz 1.2M OFDM, limit corrected for system losses
Ref Level 12 dBm ATTEN 30 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 20.0msec
Marker: 902.0MHz -64.922dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
dBm
901
902
903
904
905
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

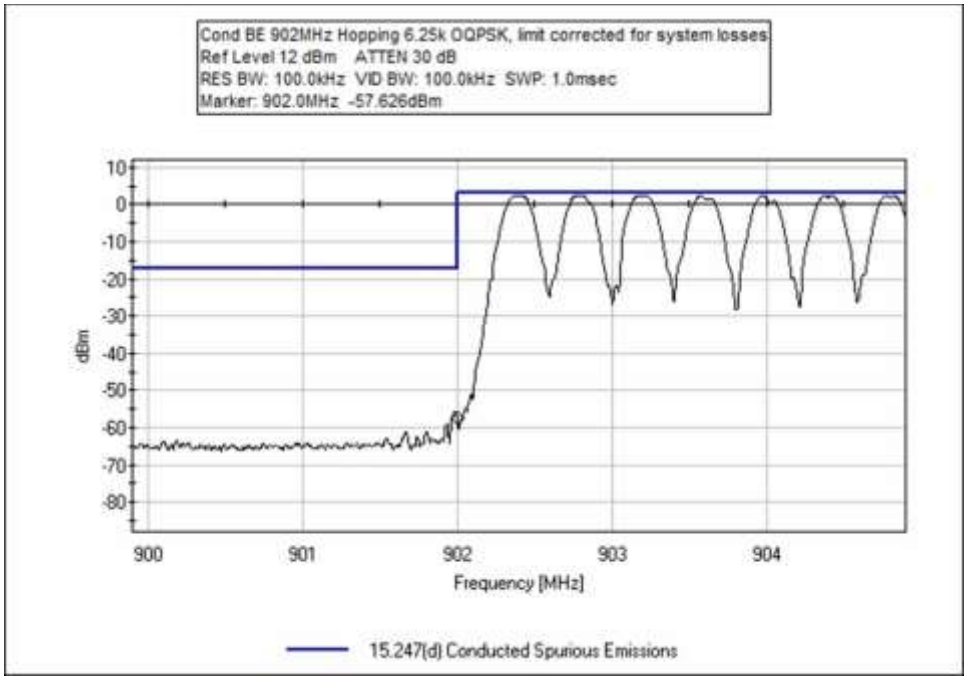

Cond BE 928MHz 1.2M OFDM, limit corrected for system losses
Ref Level 12 dBm ATTEN 30 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 20.0msec
Marker: 928.0MHz -65.218dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
dBm
925
926
927
928
929
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

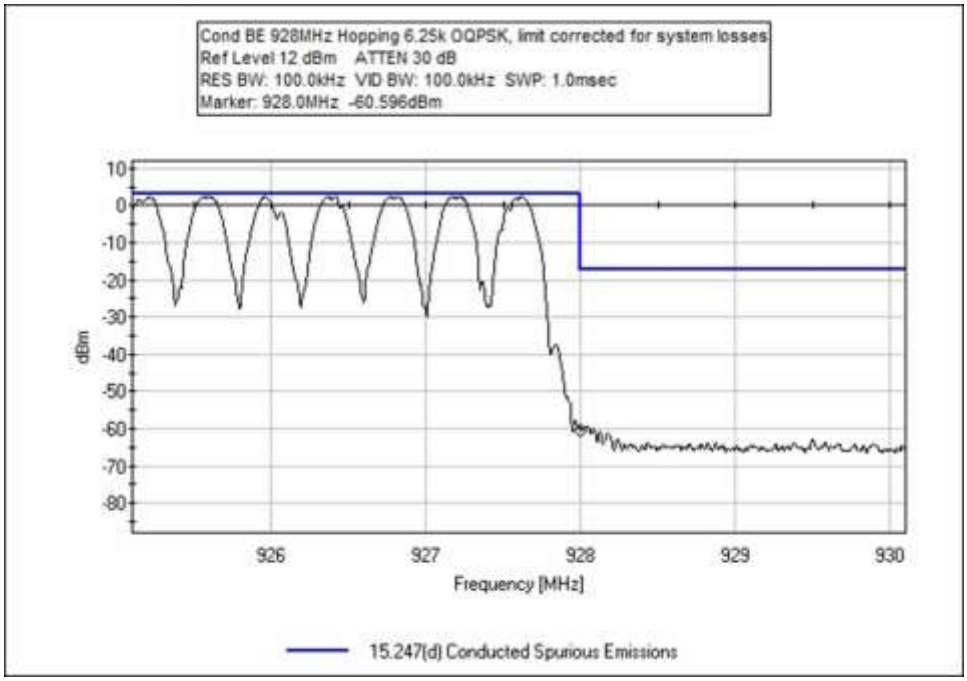
GFSK Hopping



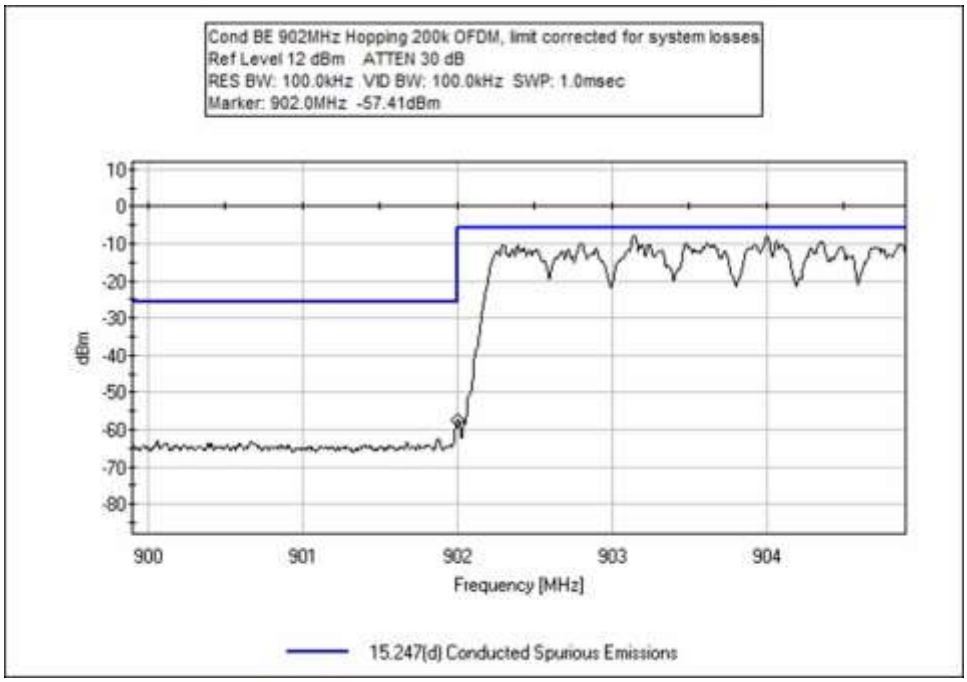


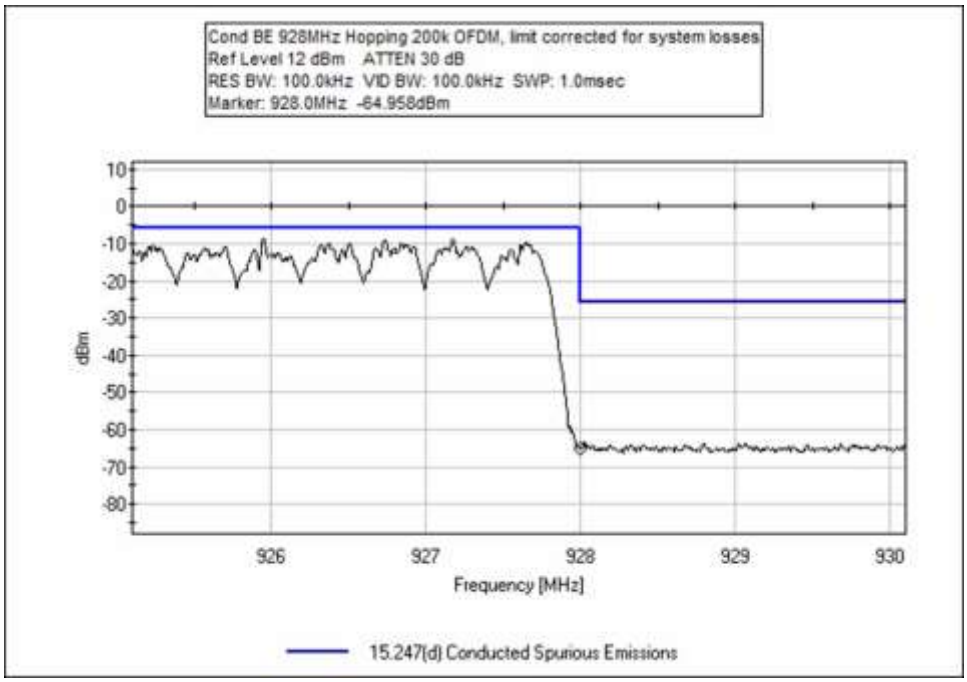
OQPSK Hopping

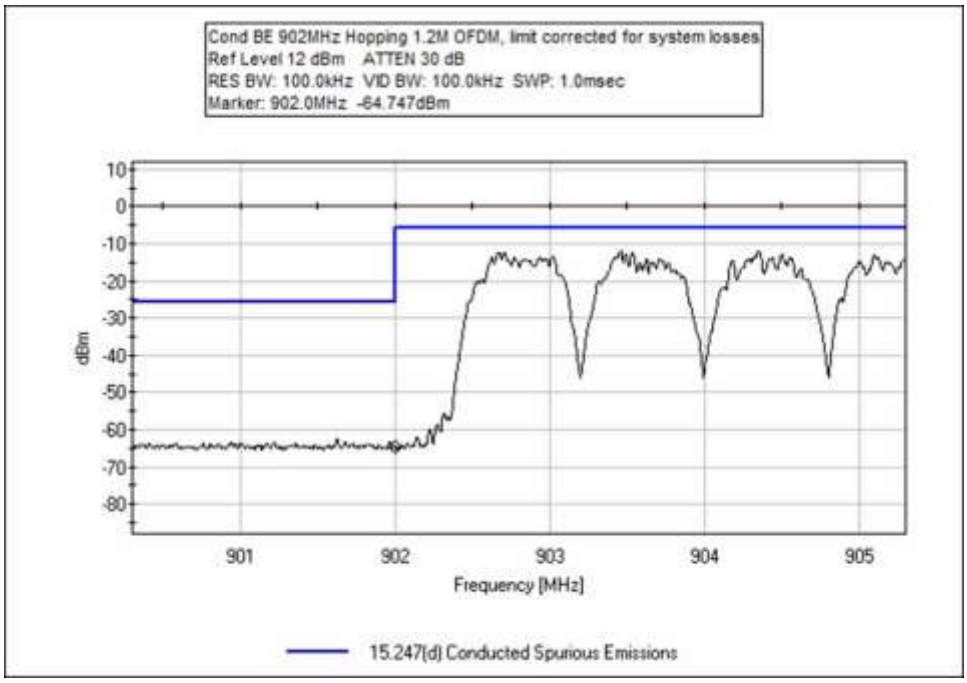


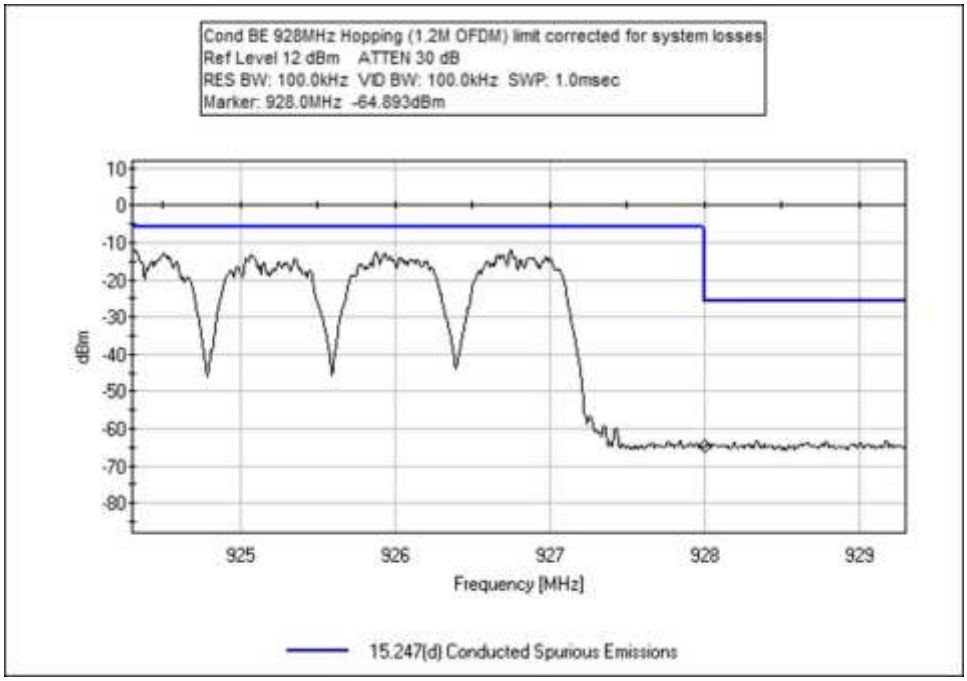


OFDM Hopping






Cond BE 902MHz Hopping 1.2M OFDM, limit corrected for system losses
Ref Level 12 dBm ATTEN 30 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 1.0msec
Marker: 902.0MHz -64.747dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
dBm
901
902
903
904
905
Frequency [MHz]
15.247(d) Conducted Spurious Emissions


Cond BE 928MHz Hopping (1.2M OFDM) limit corrected for system losses
Ref Level 12 dBm ATTEN 30 dB
RES BW: 100.0kHz VID BW: 100.0kHz SWP: 1.0msec
Marker: 928.0MHz -64.893dBm
10
0
-10
-20
-30
-40
-50
-60
-70
-80
dBm
925
926
927
928
929
Frequency [MHz]
15.247(d) Conducted Spurious Emissions

Test Setup / Conditions / Data

Test Location:	CKC Laboratories • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**101674**	Date:	8/28/2018
Test Type:	**Conducted Emissions**	Time:	14:58:40
Tested By:	Michael Atkinson	Sequence#:	5
Software:	EMITest 5.03.11		115VAC 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Frequency Range: Fundamental
Frequency tested: Low and High Channels
Firmware power setting: Max
Firmware: CAM3-DEV Major Number 4, Minor Number 7, Build Number 153, Revision Number 787268
Test Software: CAM3 FCC Test Helper v14

Modulation Types:
10k GFSK, 50k GFSK, 150k GFSK
6.25k OQPSK, 12.5k OQPSK
200k OFDM, 600k OFDM, 1.2M OFDM (Hybrid)
Hopping modes: 10k GFSK, 6.25k OQPSK, 200k OFDM, 1.2M OFDM.

Antenna type: External Colinear Omni
Antenna Gain : 2.8dBi (attached), 5.5dBi (remote), 8.15dBi with 3dB attenuator (remote)

Duty Cycle: Tested at 100%

Test Location: Bothell Lab Bench
Test Method: ANSI C63.10 (2013)
Temperature (ºC): 22-24
Relative Humidity (%): 38-42

Setup: The EUT is continuously transmitting with modulation on ISM port.
The EUT ISM port is connected directly to a spectrum analyzer for direct conducted measurements.
Low, Mid, High channels investigated, all modulation types investigated
All modulation types investigated in addition to several modulations investigated as worst case for frequency hopping mode.
Hopping mode followed correct pseudo-random pattern, but Tx on time and time between hops were not controlled at time of test.

Test Equipment:

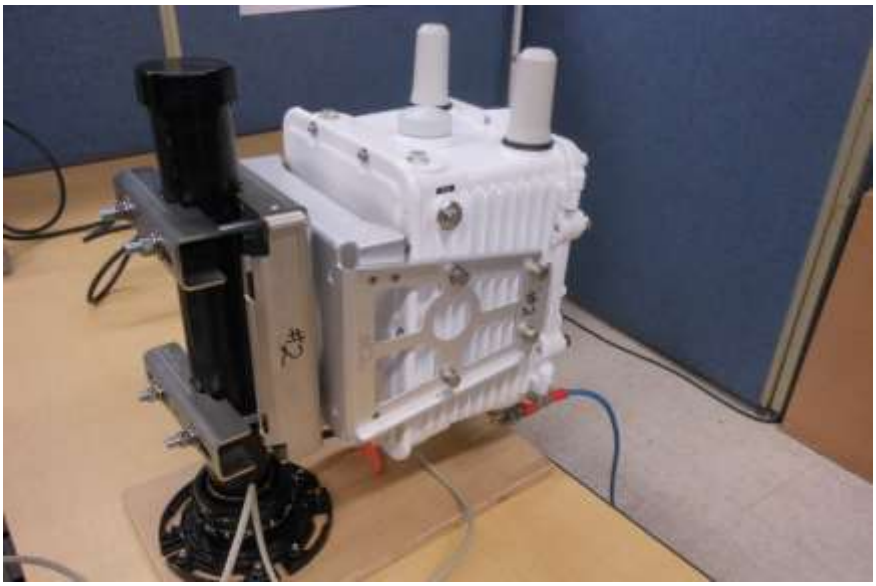
ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02673	Spectrum Analyzer	E4446A	2/3/2017	2/3/2019
T2	ANP07228	Attenuator	PE7004-20	11/30/2017	11/30/2019
T3	ANP07226	Attenuator	PE7004-6	12/1/2017	12/1/2019
T4	ANP06008	Cable	Heliax	4/10/2018	4/10/2020

Measurement Data: Reading listed by margin. Test Lead: RF Port

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	901.960M	-46.4	+0.0	+20.0	+5.8	+0.8	+0.0	-19.8	1.0 200k OFDM	-20.8	RF Po
2	928.040M	-47.7	+0.0	+20.0	+5.8	+0.8	+0.0	-21.1	1.0 200k OFDM	-22.1	RF Po
3	902.000M	-41.8	+0.0	+20.0	+5.8	+0.8	+0.0	-15.2	9.5 Hopping (10k GFSK)	-24.7	RF Po
4	902.000M	-44.8	+0.0	+20.0	+5.8	+0.8	+0.0	-18.2	9.5 10k GFSK	-27.7	RF Po
5	902.000M	-53.7	+0.0	+20.0	+5.8	+0.8	+0.0	-27.1	1.0 200k OFDM	-28.1	RF Po
6	902.000M	-53.9	+0.0	+20.0	+5.8	+0.8	+0.0	-27.3	1.0 600k OFDM	-28.3	RF Po
7	928.000M	-56.3	+0.0	+20.0	+5.8	+0.8	+0.0	-29.7	1.0 200k OFDM	-30.7	RF Po
8	928.000M	-56.5	+0.0	+20.0	+5.8	+0.8	+0.0	-29.9	1.0 600k OFDM	-30.9	RF Po
9	902.000M	-57.4	+0.0	+20.0	+5.8	+0.8	+0.0	-30.8	1.0 Hopping (200k OFDM)	-31.8	RF Po
10	928.000M	-49.6	+0.0	+20.0	+5.8	+0.8	+0.0	-23.0	9.5 10k GFSK	-32.5	RF Po
11	928.000M	-52.6	+0.0	+20.0	+5.8	+0.8	+0.0	-26.0	9.5 150k GFSK	-35.5	RF Po
12	902.000M	-53.6	+0.0	+20.0	+5.8	+0.8	+0.0	-27.0	9.5 6.25k OQPSK	-36.5	RF Po
13	928.000M	-53.7	+0.0	+20.0	+5.8	+0.8	+0.0	-27.1	9.5 6.25k OQPSK	-36.6	RF Po
14	928.000M	-54.1	+0.0	+20.0	+5.8	+0.8	+0.0	-27.5	9.5 12.5k OQPSK	-37.0	RF Po
15	928.000M	-54.4	+0.0	+20.0	+5.8	+0.8	+0.0	-27.8	9.5 50k GFSK	-37.3	RF Po
16	902.000M	-54.5	+0.0	+20.0	+5.8	+0.8	+0.0	-27.9	9.5 150k GFSK	-37.4	RF Po
17	902.000M	-55.4	+0.0	+20.0	+5.8	+0.8	+0.0	-28.8	9.5 50k GFSK	-38.3	RF Po
18	902.000M	-55.5	+0.0	+20.0	+5.8	+0.8	+0.0	-28.9	9.5 12.5k OQPSK	-38.4	RF Po
19	902.000M	-64.7	+0.0	+20.0	+5.8	+0.8	+0.0	-38.1	1.0 Hopping (1.2M OFDM)	-39.1	RF Po

20	902.000M	-64.9	+0.0	+20.0	+5.8	+0.8	+0.0	-38.3	1.0	-39.3	RF Po 1.2M OFDM
21	928.000M	-64.9	+0.0	+20.0	+5.8	+0.8	+0.0	-38.3	1.0	-39.3	RF Po Hopping (1.2M OFDM)
22	928.000M	-65.0	+0.0	+20.0	+5.8	+0.8	+0.0	-38.4	1.0	-39.4	RF Po Hopping (200k OFDM)
23	928.000M	-65.2	+0.0	+20.0	+5.8	+0.8	+0.0	-38.6	1.0	-39.6	RF Po 1.2M OFDM
24	902.000M	-57.6	+0.0	+20.0	+5.8	+0.8	+0.0	-31.0	9.5	-40.5	RF Po Hopping (6.25k OQPSK)
25	928.000M	-58.7	+0.0	+20.0	+5.8	+0.8	+0.0	-32.1	9.5	-41.6	RF Po Hopping (10k GFSK)
26	928.000M	-60.6	+0.0	+20.0	+5.8	+0.8	+0.0	-34.0	9.5	-43.5	RF Po Hopping (6.25k OQPSK)

Test Setup Photo



15.247(d) Radiated Emissions & Band Edge

Test Setup / Conditions / Data

Test Location:	CKC Laboratories • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**101674**	Date:	8/28/2018
Test Type:	**Radiated Scan**	Time:	11:16:04
Tested By:	Michael Atkinson	Sequence#:	6
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

Frequency Range: 9kHz-9.28GHz
Frequency tested: Low, Mid, High Channels
Firmware power setting: Max
Firmware: CAM3-DEV Major Number 4, Minor Number 7, Build Number 153, Revision Number 787268
Test Software: CAM3 FCC Test Helper v14

Modulation Types:
10k GFSK, 50k GFSK, 150k GFSK
6.25k OQPSK, 12.5k OQPSK
200k OFDM, 600k OFDM, 1.2M OFDM (Hybrid)

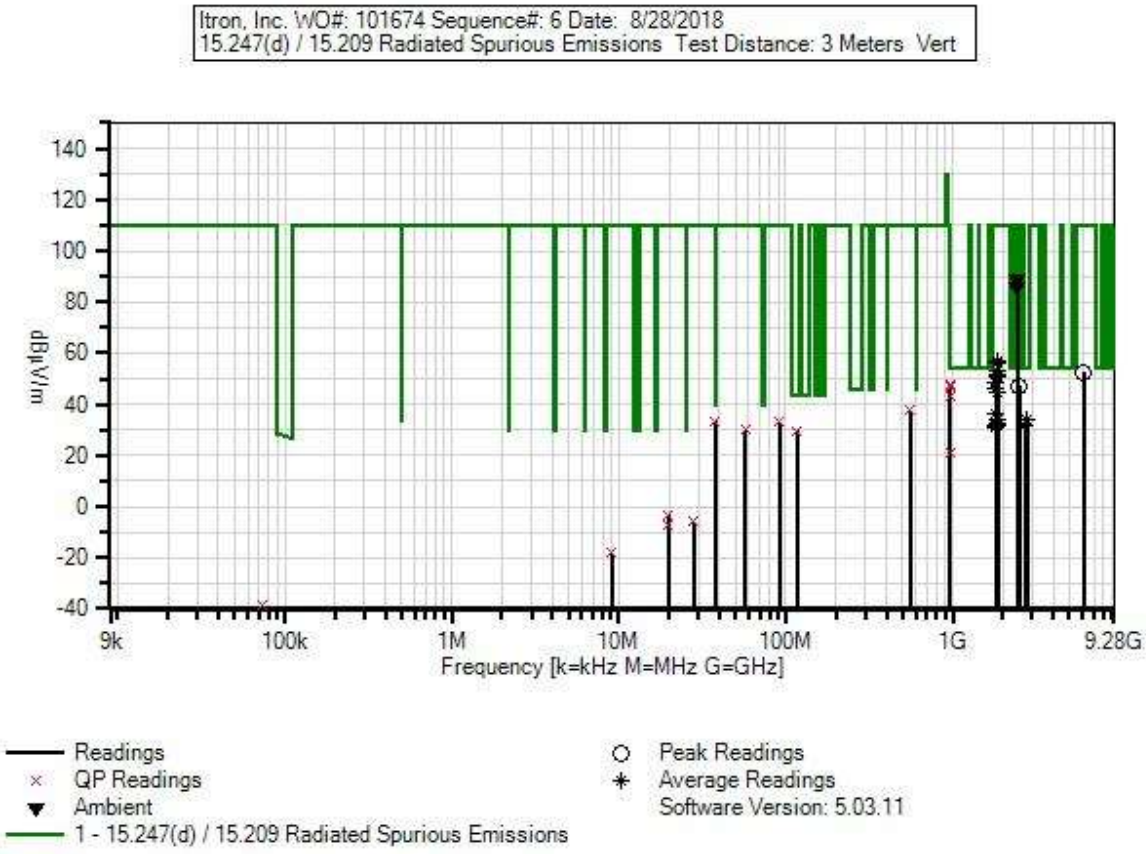
Antenna type: External Colinear Omni
Antenna Gain :2.8dBi (attached)

Duty Cycle: Tested at 100%

Test Location: Bothell Lab C3
Test Method: ANSI C63.10 (2013)
Temperature (ºC): 22-24
Relative Humidity (%): 38-42

Setup: The EUT is continuously transmitting with modulation on ISM port.
The EUT is connected to external antenna.
Low, Mid, and High channels investigated, worst case reported.
All modulation types investigated.
Horizontal and Vertical measurement antennas investigated above 30MHz, worst case reported.
3 orthogonal axes investigated below 30MHz, worst case reported.
Fundamental of separate Wi-Fi module marked as ambient, and is to be ignored for this measurement.

No additional peak emissions observed within 20dB of the peak limit.


Itron, Inc. WO#: 101674 Sequence#: 6 Date: 8/28/2018
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert
140
120
100
80
60
40
20
0
-20
-40
dBuV/m
9k
100k
1M
10M
100M
1G
9.28G
Frequency [k=kHz M=MHz G=GHz]
Readings
QP Readings
Ambient
1 - 15.247(d) / 15.209 Radiated Spurious Emissions
Peak Readings
Average Readings
Software Version: 5.03.11

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02673	Spectrum Analyzer	E4446A	2/3/2017	2/3/2019
T2	ANP06540	Cable	Heliax	10/30/2017	10/30/2019
T3	ANP05305	Cable	ETSI-50T	10/24/2017	10/24/2019
T4	ANP05360	Cable	RG214	1/31/2018	1/31/2020
T5	AN03628	Biconilog Antenna	3142E	6/7/2017	6/7/2019
T6	ANP06515	Cable	Heliax	6/29/2018	6/29/2020
T7	AN00052	Loop Antenna	6502	5/7/2018	5/7/2020
T8	AN02871	Spectrum Analyzer	E4440A	2/24/2017	2/24/2019
T9	AN03540	Preamp	83017A	5/2/2017	5/2/2019
T10	ANP06934	Cable	32026-29801-29801-18	3/13/2018	3/13/2020
T11	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	7/21/2017	7/21/2019
T12	AN03170	High Pass Filter	HM1155-11SS	11/27/2017	11/27/2019
T13	ANP07226	Attenuator	PE7004-6	12/1/2017	12/1/2019
T14	ANP06503	Cable	32026-29801-29801-36	3/13/2018	3/13/2020

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9 T13	T2 T6 T10 T14	T3 T7 T11	T4 T8 T12	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	963.745M	18.7	+0.0	+0.4	+1.6	+2.1	+0.0	47.6	54.0	-6.4	Vert
	QP		+24.8	+0.0	+0.0	+0.0			10k GFSK		
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
2	37.700M	21.1	+0.0	+0.1	+0.3	+0.3	+0.0	33.5	40.0	-6.5	Vert
	QP		+11.7	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
3	963.613M	18.6	+0.0	+0.4	+1.6	+2.1	+0.0	47.5	54.0	-6.5	Vert
	QP		+24.8	+0.0	+0.0	+0.0			12.5 OQPSK		
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
4	963.613M	18.5	+0.0	+0.4	+1.6	+2.1	+0.0	47.4	54.0	-6.6	Vert
	QP		+24.8	+0.0	+0.0	+0.0			6.25k OQPSK		
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
5	963.603M	18.5	+0.0	+0.4	+1.6	+2.1	+0.0	47.4	54.0	-6.6	Vert
	QP		+24.8	+0.0	+0.0	+0.0			50k GFSK		
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
6	963.623M	18.4	+0.0	+0.4	+1.6	+2.1	+0.0	47.3	54.0	-6.7	Vert
	QP		+24.8	+0.0	+0.0	+0.0			150k GFSK		
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							

7	962.908M QP	14.6	+0.0 +24.8 +0.0 +0.0	+0.4 +0.0 +0.0 +0.0	+1.6 +0.0 +0.0	+2.1 +0.0 +0.0	+0.0	43.5	54.0 1.2M OFDM	-10.5	Vert
8	963.613M QP	14.6	+0.0 +24.8 +0.0 +0.0	+0.4 +0.0 +0.0 +0.0	+1.6 +0.0 +0.0	+2.1 +0.0 +0.0	+0.0	43.5	54.0 200k OFDM	-10.5	Vert
9	963.658M QP	14.6	+0.0 +24.8 +0.0 +0.0	+0.4 +0.0 +0.0 +0.0	+1.6 +0.0 +0.0	+2.1 +0.0 +0.0	+0.0	43.5	54.0 600k OFDM	-10.5	Vert
10	116.155M QP	20.5	+0.0 +7.6 +0.0 +0.0	+0.2 +0.0 +0.0 +0.0	+0.6 +0.0 +0.0	+0.6 +0.0 +0.0	+0.0	29.5	43.5	-14.0	Horiz
11	2783.240M Ave	28.3	+0.0 +0.0 -33.8 +5.8	+0.5 +2.6 +0.0 +1.1	+0.0 +0.0 +28.9	+0.0 +0.0 +0.6	+0.0	34.0	54.0 10k GFSK	-20.0	Vert
12	2430.000M Ambient	84.6	+0.0 +0.0 -34.0 +5.8	+0.4 +2.6 +0.0 +1.0	+0.0 +0.0 +28.1	+0.0 +0.0 +0.6	+0.0	89.1	110.0	-20.9	Vert
13	2706.628M Ave	26.5	+0.0 +0.0 -33.8 +5.8	+0.5 +2.6 +0.0 +1.1	+0.0 +0.0 +28.7	+0.0 +0.0 +0.6	+0.0	32.0	54.0 10k GFSK	-22.0	Vert
^	2706.628M	39.1	+0.0 +0.0 -33.8 +5.8	+0.5 +2.6 +0.0 +1.1	+0.0 +0.0 +28.7	+0.0 +0.0 +0.6	+0.0	44.6	54.0 10k GFSK	-9.4	Vert
15	2430.000M Ambient	81.6	+0.0 +0.0 -34.0 +5.8	+0.4 +2.6 +0.0 +1.0	+0.0 +0.0 +28.1	+0.0 +0.0 +0.6	+0.0	86.1	110.0	-23.9	Horiz
16	963.600M QP	19.8	+0.0 +0.0 -37.1 +5.8	+0.4 +1.7 +0.3 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 +30.1	+0.0	21.0	54.0	-33.0	Vert
17	963.604M QP	19.7	+0.0 +0.0 -37.1 +5.8	+0.4 +1.7 +0.3 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 +30.1	+0.0	20.9	54.0	-33.1	Vert
18	1855.490M Ave	54.2	+0.0 +0.0 -34.5 +5.9	+0.4 +2.3 +0.0 +0.7	+0.0 +0.0 +26.9	+0.0 +0.0 +0.7	+0.0	56.6	102.0 10k GFSK	-45.4	Vert
19	1855.240M Ave	54.1	+0.0 +0.0 -34.5 +5.9	+0.4 +2.3 +0.0 +0.7	+0.0 +0.0 +26.8	+0.0 +0.0 +0.7	+0.0	56.4	102.0 50k GFSK	-45.6	Vert

20	1855.192M	54.0	+0.0	+0.4	+0.0	+0.0	+0.0	56.3	102.0	-45.7	Vert
	Ave		+0.0	+2.3	+0.0	+0.0			12.5k OQPSK		
			-34.5	+0.0	+26.8	+0.7					
			+5.9	+0.7							
21	1855.124M	53.9	+0.0	+0.4	+0.0	+0.0	+0.0	56.2	102.0	-45.8	Vert
	Ave		+0.0	+2.3	+0.0	+0.0			6.25k OQPSK		
			-34.5	+0.0	+26.8	+0.7					
			+5.9	+0.7							
22	1855.308M	53.4	+0.0	+0.4	+0.0	+0.0	+0.0	55.8	102.0	-46.2	Vert
	Ave		+0.0	+2.3	+0.0	+0.0			150k GFSK		
			-34.5	+0.0	+26.9	+0.7					
			+5.9	+0.7							
23	1830.040M	50.8	+0.0	+0.4	+0.0	+0.0	+0.0	52.9	102.0	-49.1	Vert
	Ave		+0.0	+2.3	+0.0	+0.0			10k GFSK		
			-34.5	+0.0	+26.6	+0.7					
			+5.9	+0.7							
24	6115.000M	37.2	+0.0	+0.7	+0.0	+0.0	+0.0	52.6	102.0	-49.4	Vert
			+0.0	+4.8	+0.0	+0.0					
			-33.4	+0.0	+35.0	+0.5					
			+5.9	+1.9							
25	1830.409M	49.2	+0.0	+0.4	+0.0	+0.0	+0.0	51.3	102.0	-50.7	Vert
	Ave		+0.0	+2.3	+0.0	+0.0			12.5k OQPSK		
			-34.5	+0.0	+26.6	+0.7					
			+5.9	+0.7							
26	1830.373M	49.2	+0.0	+0.4	+0.0	+0.0	+0.0	51.3	102.0	-50.7	Vert
	Ave		+0.0	+2.3	+0.0	+0.0			6.25k OQPSK		
			-34.5	+0.0	+26.6	+0.7					
			+5.9	+0.7							
27	1830.445M	48.9	+0.0	+0.4	+0.0	+0.0	+0.0	51.0	102.0	-51.0	Vert
	Ave		+0.0	+2.3	+0.0	+0.0			50k GFSK		
			-34.5	+0.0	+26.6	+0.7					
			+5.9	+0.7							
28	1830.461M	48.8	+0.0	+0.4	+0.0	+0.0	+0.0	50.9	102.0	-51.1	Vert
	Ave		+0.0	+2.3	+0.0	+0.0			150k GFSK		
			-34.5	+0.0	+26.6	+0.7					
			+5.9	+0.7							
29	1804.420M	46.8	+0.0	+0.5	+0.0	+0.0	+0.0	48.7	102.0	-53.3	Vert
	Ave		+0.0	+2.2	+0.0	+0.0			10k GFSK		
			-34.5	+0.0	+26.4	+0.7					
			+5.9	+0.7							
30	2514.000M	42.7	+0.0	+0.4	+0.0	+0.0	+0.0	47.3	102.0	-54.7	Vert
			+0.0	+2.7	+0.0	+0.0					
			-34.0	+0.0	+28.1	+0.6					
			+5.8	+1.0							
31	1804.860M	44.4	+0.0	+0.5	+0.0	+0.0	+0.0	46.3	102.0	-55.7	Vert
	Ave		+0.0	+2.2	+0.0	+0.0			6.25k OQPSK		
			-34.5	+0.0	+26.4	+0.7					
			+5.9	+0.7							
32	1804.830M	44.4	+0.0	+0.5	+0.0	+0.0	+0.0	46.3	102.0	-55.7	Vert
	Ave		+0.0	+2.2	+0.0	+0.0			12.5k OQPSK		
			-34.5	+0.0	+26.4	+0.7					
			+5.9	+0.7							

33	1804.830M Ave	44.3	+0.0 +0.0 -34.5 +5.9	+0.5 +2.2 +0.0 +0.7	+0.0 +0.0 +26.4	+0.0 +0.0 +0.7	+0.0	46.2	102.0 50k GFSK	-55.8	Vert
34	1804.905M Ave	44.0	+0.0 +0.0 -34.5 +5.9	+0.5 +2.2 +0.0 +0.7	+0.0 +0.0 +26.4	+0.0 +0.0 +0.7	+0.0	45.9	102.0 150k GFSK	-56.1	Vert
35	1830.128M Ave	42.4	+0.0 +0.0 -34.5 +5.9	+0.4 +2.3 +0.0 +0.7	+0.0 +0.0 +26.6	+0.0 +0.0 +0.7	+0.0	44.5	102.0 Rx	-57.5	Vert
36	556.200M QP	14.7	+0.0 +20.2 +0.0 +0.0	+0.3 +0.0 +0.0 +0.0	+1.2 +0.0 +0.0	+1.4 +0.0 +0.0	+0.0	37.8	102.0	-64.2	Vert
37	1804.432M Ave	34.5	+0.0 +0.0 -34.5 +5.9	+0.5 +2.2 +0.0 +0.7	+0.0 +0.0 +26.4	+0.0 +0.0 +0.7	+0.0	36.4	102.0 10k GFSK	-65.6	Horiz
38	91.505M QP	24.7	+0.0 +7.1 +0.0 +0.0	+0.1 +0.0 +0.0 +0.0	+0.5 +0.0 +0.0	+0.5 +0.0 +0.0	+0.0	32.9	102.0	-69.1	Vert
39	91.505M QP	24.7	+0.0 +7.1 +0.0 +0.0	+0.1 +0.0 +0.0 +0.0	+0.5 +0.0 +0.0	+0.5 +0.0 +0.0	+0.0	32.9	102.0	-69.1	Vert
40	57.000M QP	22.5	+0.0 +6.6 +0.0 +0.0	+0.1 +0.0 +0.0 +0.0	+0.4 +0.0 +0.0	+0.4 +0.0 +0.0	+0.0	30.0	102.0	-72.0	Vert
41	1855.247M Ave	31.7	+0.0 +0.0 -34.5 +5.9	+0.4 +2.3 +0.0 +0.7	+0.0 +0.0 +26.8	+0.0 +0.0 +0.7	+0.0	34.0	110.0 200k OFDM	-76.0	Vert
42	1855.267M Ave	31.6	+0.0 +0.0 -34.5 +5.9	+0.4 +2.3 +0.0 +0.7	+0.0 +0.0 +26.8	+0.0 +0.0 +0.7	+0.0	33.9	110.0 600k OFDM	-76.1	Vert
43	1853.580M Ave	30.4	+0.0 +0.0 -34.5 +5.9	+0.4 +2.3 +0.0 +0.7	+0.0 +0.0 +26.8	+0.0 +0.0 +0.7	+0.0	32.7	110.0 1.2M OFDM	-77.3	Vert
44	1804.830M Ave	30.1	+0.0 +0.0 -34.5 +5.9	+0.5 +2.2 +0.0 +0.7	+0.0 +0.0 +26.4	+0.0 +0.0 +0.7	+0.0	32.0	110.0 200k OFDM	-78.0	Vert
45	1829.570M Ave	29.8	+0.0 +0.0 -34.5 +5.9	+0.4 +2.3 +0.0 +0.7	+0.0 +0.0 +26.6	+0.0 +0.0 +0.7	+0.0	31.9	110.0 1.2M OFDM	-78.1	Vert

46	1830.415M Ave	29.4	+0.0 +0.0 -34.5 +5.9	+0.4 +2.3 +0.0 +0.7	+0.0 +0.0 +26.6	+0.0 +0.0 +0.7	+0.0	31.5	110.0 600k OFDM	-78.5	Vert
47	1830.409M Ave	29.4	+0.0 +0.0 -34.5 +5.9	+0.4 +2.3 +0.0 +0.7	+0.0 +0.0 +26.6	+0.0 +0.0 +0.7	+0.0	31.5	110.0 200k OFDM	-78.5	Vert
48	1805.480M Ave	29.5	+0.0 +0.0 -34.5 +5.9	+0.5 +2.2 +0.0 +0.7	+0.0 +0.0 +26.4	+0.0 +0.0 +0.7	+0.0	31.4	110.0 1.2M OFDM	-78.6	Vert
49	1804.724M Ave	29.4	+0.0 +0.0 -34.5 +5.9	+0.5 +2.2 +0.0 +0.7	+0.0 +0.0 +26.4	+0.0 +0.0 +0.7	+0.0	31.3	110.0 600k OFDM	-78.7	Vert
50	19.739M QP	28.4	+0.0 +0.0 +0.0 +0.0	+0.0 +0.2 +0.0 +0.0	+0.0 +8.1 +0.0	+0.0 +0.0 +0.0	-40.0	-3.3	102.0	-105.3	Groun
51	28.116M QP	27.6	+0.0 +0.0 +0.0 +0.0	+0.1 +0.3 +0.0 +0.0	+0.0 +6.1 +0.0	+0.0 +0.0 +0.0	-40.0	-5.9	102.0	-107.9	Para
52	19.711M QP	24.2	+0.0 +0.0 +0.0 +0.0	+0.0 +0.2 +0.0 +0.0	+0.0 +8.1 +0.0	+0.0 +0.0 +0.0	-40.0	-7.5	102.0	-109.5	Para
53	9.096M QP	12.5	+0.0 +0.0 +0.0 +0.0	+0.0 +0.2 +0.0 +0.0	+0.0 +9.3 +0.0	+0.0 +0.0 +0.0	-40.0	-18.0	102.0	-120.0	Perp
54	72.622k QP	31.8	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +9.6 +0.0	+0.0 +0.0 +0.0	-80.0	-38.6	102.0	-140.6	Para

Test Location:	CKC Laboratories • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**101674**	Date:	8/28/2018
Test Type:	**Radiated Scan**	Time:	10:34:12
Tested By:	Michael Atkinson	Sequence#:	6
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 3			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 3			

Test Conditions / Notes:

Frequency Range: 9kHz-9.28GHz
Frequency tested: Low, Mid, High Channels
Firmware power setting: Max
Firmware: CAM3-DEV Major Number 4, Minor Number 7, Build Number 153, Revision Number 787268
Test Software: CAM3 FCC Test Helper v14

Modulation Types:
10k GFSK, 50k GFSK, 150k GFSK
6.25k OQPSK, 12.5k OQPSK
200k OFDM, 600k OFDM, 1.2M OFDM (Hybrid)

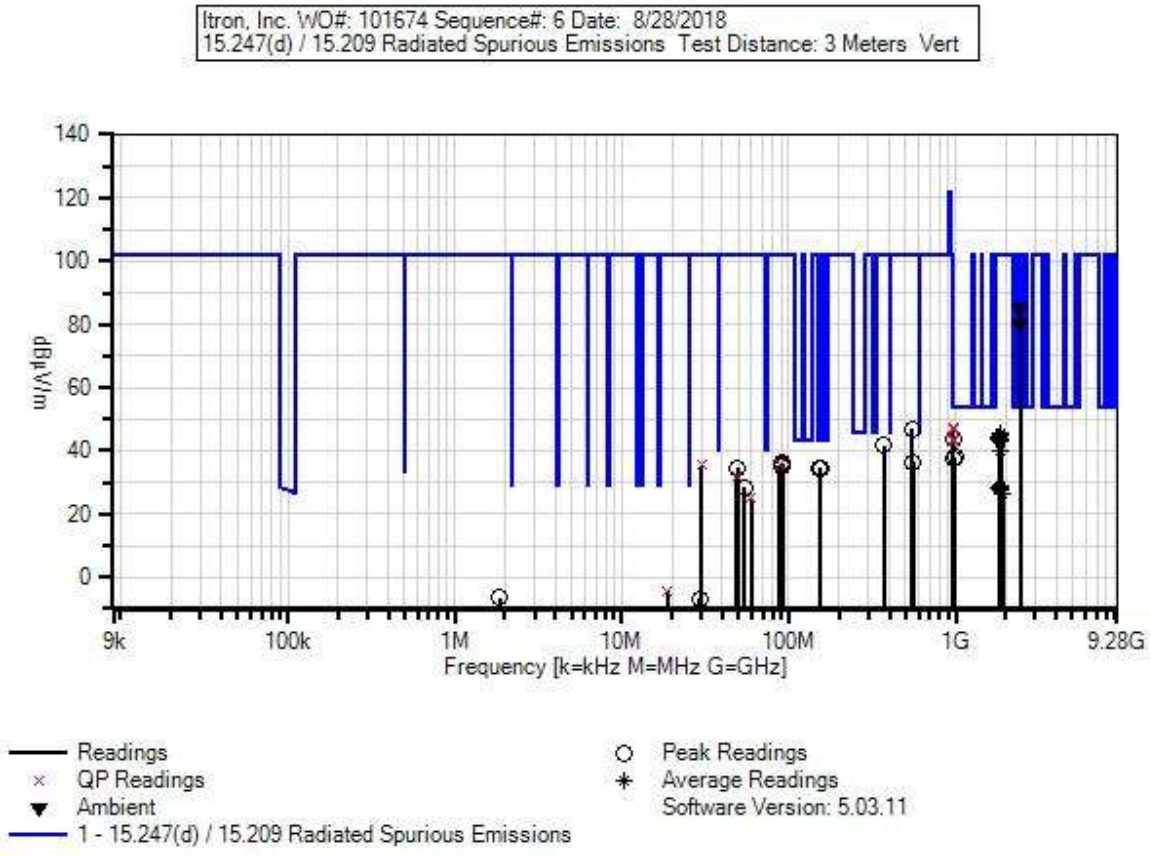
Antenna type: External Colinear Omni
Antenna Gain :5.5dBi (remote)

Duty Cycle: Tested at 100%

Test Location: Bothell Lab C3
Test Method: ANSI C63.10 (2013)
Temperature (ºC): 22-24
Relative Humidity (%): 38-42

Setup: The EUT is continuously transmitting with modulation on ISM port.
The EUT is connected to external antenna.
Low, Mid, and High channels investigated, worst case reported.
All modulation types investigated.
Horizontal and Vertical measurement antennas investigated above 30MHz, worst case reported.
3 orthogonal axes investigated below 30MHz, worst case reported.
Fundamental of separate Wi-Fi module marked as ambient, and is to be ignored for this measurement.

No additional peak emissions observed within 20dB of the peak limit.


Itron, Inc. WO#: 101674 Sequence#: 6 Date: 8/28/2018
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert
140
120
100
80
60
40
20
0
dBµV/m
9k
100k
1M
10M
100M
1G
9.28G
Frequency [k=kHz M=MHz G=GHz]
Readings
QP Readings
Ambient
1 - 15.247(d) / 15.209 Radiated Spurious Emissions
Peak Readings
Average Readings
Software Version: 5.03.11

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/3/2017	2/3/2019
T1	ANP06540	Cable	Heliax	10/30/2017	10/30/2019
T2	ANP05305	Cable	ETSI-50T	10/24/2017	10/24/2019
T3	ANP05360	Cable	RG214	1/31/2018	1/31/2020
T4	AN03628	Biconilog Antenna	3142E	6/7/2017	6/7/2019
T5	ANP06515	Cable	Heliax	6/29/2018	6/29/2020
T6	AN00052	Loop Antenna	6502	5/7/2018	5/7/2020
T7	AN02871	Spectrum Analyzer	E4440A	2/24/2017	2/24/2019
T8	AN03540	Preamp	83017A	5/2/2017	5/2/2019
T9	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	7/21/2017	7/21/2019
T10	AN03170	High Pass Filter	HM1155-11SS	11/27/2017	11/27/2019
T11	ANP07226	Attenuator	PE7004-6	12/1/2017	12/1/2019
T12	ANP06503	Cable	32026-29801-29801-36	3/13/2018	3/13/2020

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8 T12	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	963.742M	18.5	+0.4	+1.6	+2.1	+24.8	+0.0	47.4	54.0	-6.6	Vert
	QP		+0.0	+0.0	+0.0	+0.0			10k GFSK		
			+0.0	+0.0	+0.0	+0.0					
2	963.601M	18.0	+0.4	+1.6	+2.1	+24.8	+0.0	46.9	54.0	-7.1	Vert
	QP		+0.0	+0.0	+0.0	+0.0			6.25k OQPSK		
			+0.0	+0.0	+0.0	+0.0					
3	963.599M	17.9	+0.4	+1.6	+2.1	+24.8	+0.0	46.8	54.0	-7.2	Vert
	QP		+0.0	+0.0	+0.0	+0.0			12.5 OQPSK		
			+0.0	+0.0	+0.0	+0.0					
4	963.609M	17.9	+0.4	+1.6	+2.1	+24.8	+0.0	46.8	54.0	-7.2	Vert
	QP		+0.0	+0.0	+0.0	+0.0			150k GFSK		
			+0.0	+0.0	+0.0	+0.0					
5	963.600M	17.8	+0.4	+1.6	+2.1	+24.8	+0.0	46.7	54.0	-7.3	Vert
	QP		+0.0	+0.0	+0.0	+0.0			50k GFSK		
			+0.0	+0.0	+0.0	+0.0					
6	963.778M	17.7	+0.4	+1.6	+2.1	+24.8	+0.0	46.6	54.0	-7.4	Vert
	QP		+0.0	+0.0	+0.0	+0.0			10k GFSK		
			+0.0	+0.0	+0.0	+0.0					
7	962.887M	14.5	+0.4	+1.6	+2.1	+24.8	+0.0	43.4	54.0	-10.6	Vert
	QP		+0.0	+0.0	+0.0	+0.0			1.2M OFDM		
			+0.0	+0.0	+0.0	+0.0					
8	963.599M	14.4	+0.4	+1.6	+2.1	+24.8	+0.0	43.3	54.0	-10.7	Vert
	QP		+0.0	+0.0	+0.0	+0.0			600k OFDM		
			+0.0	+0.0	+0.0	+0.0					
9	963.599M	14.4	+0.4	+1.6	+2.1	+24.8	+0.0	43.3	54.0	-10.7	Vert
	QP		+0.0	+0.0	+0.0	+0.0			200k OFDM		
			+0.0	+0.0	+0.0	+0.0					

10	983.320M	9.4	+0.4	+1.6	+2.1	+24.4	+0.0	37.9	54.0	-16.1	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
11	982.720M	9.2	+0.4	+1.6	+2.1	+24.4	+0.0	37.7	54.0	-16.3	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
12	2434.000M	83.3	+0.0	+0.0	+0.0	+0.0	+0.0	84.8	102.0	-17.2	Vert
	Ambient		+0.0	+0.0	+0.0	-34.0					
			+28.1	+0.6	+5.8	+1.0					
13	2434.000M	78.8	+0.0	+0.0	+0.0	+0.0	+0.0	80.3	102.0	-21.7	Horiz
	Ambient		+0.0	+0.0	+0.0	-34.0					
			+28.1	+0.6	+5.8	+1.0					
14	545.100M	23.0	+0.3	+1.2	+1.4	+21.0	+0.0	46.9	102.0	-55.1	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
15	1855.194M	45.8	+0.0	+0.0	+0.0	+0.0	+0.0	45.4	102.0	-56.6	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			12.5k OQPSK		
			+26.8	+0.7	+5.9	+0.7					
16	1855.224M	45.8	+0.0	+0.0	+0.0	+0.0	+0.0	45.4	102.0	-56.6	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			6.25k OQPSK		
			+26.8	+0.7	+5.9	+0.7					
17	1855.200M	45.7	+0.0	+0.0	+0.0	+0.0	+0.0	45.3	102.0	-56.7	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			50k GFSK		
			+26.8	+0.7	+5.9	+0.7					
18	1855.170M	45.5	+0.0	+0.0	+0.0	+0.0	+0.0	45.1	102.0	-56.9	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			150k GFSK		
			+26.8	+0.7	+5.9	+0.7					
19	1804.882M	45.0	+0.0	+0.0	+0.0	+0.0	+0.0	44.2	102.0	-57.8	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			6.25k OQPSK		
			+26.4	+0.7	+5.9	+0.7					
20	1804.910M	44.8	+0.0	+0.0	+0.0	+0.0	+0.0	44.0	102.0	-58.0	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			12.5k OQPSK		
			+26.4	+0.7	+5.9	+0.7					
21	1804.440M	44.5	+0.0	+0.0	+0.0	+0.0	+0.0	43.7	102.0	-58.3	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			10k GFSK		
			+26.4	+0.7	+5.9	+0.7					
22	1804.889M	44.5	+0.0	+0.0	+0.0	+0.0	+0.0	43.7	102.0	-58.3	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			150k GFSK		
			+26.4	+0.7	+5.9	+0.7					
23	1804.800M	44.5	+0.0	+0.0	+0.0	+0.0	+0.0	43.7	102.0	-58.3	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			50k GFSK		
			+26.4	+0.7	+5.9	+0.7					
24	957.860M	14.7	+0.4	+1.6	+2.1	+24.9	+0.0	43.7	102.0	-58.3	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
25	1855.520M	44.0	+0.0	+0.0	+0.0	+0.0	+0.0	43.7	102.0	-58.3	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			10k GFSK		
			+26.9	+0.7	+5.9	+0.7					
26	1830.024M	43.8	+0.0	+0.0	+0.0	+0.0	+0.0	43.2	102.0	-58.8	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			10k GFSK		
			+26.6	+0.7	+5.9	+0.7					

27	369.290M	23.6	+0.2	+1.0	+1.1	+15.8	+0.0	41.7	102.0	-60.3	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
28	1830.388M	40.9	+0.0	+0.0	+0.0	+0.0	+0.0	40.3	102.0	-61.7	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			12.5k OQPSK		
			+26.6	+0.7	+5.9	+0.7					
29	1830.235M	40.9	+0.0	+0.0	+0.0	+0.0	+0.0	40.3	102.0	-61.7	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			6.25k OQPSK		
			+26.6	+0.7	+5.9	+0.7					
30	1830.235M	40.8	+0.0	+0.0	+0.0	+0.0	+0.0	40.2	102.0	-61.8	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			150k GFSK		
			+26.6	+0.7	+5.9	+0.7					
31	1830.177M	40.8	+0.0	+0.0	+0.0	+0.0	+0.0	40.2	102.0	-61.8	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			50k GFSK		
			+26.6	+0.7	+5.9	+0.7					
32	553.500M	13.3	+0.3	+1.2	+1.4	+20.4	+0.0	36.6	102.0	-65.4	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
33	91.100M	28.0	+0.1	+0.5	+0.5	+7.0	+0.0	36.1	102.0	-65.9	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
34	91.100M	27.9	+0.1	+0.5	+0.5	+7.0	+0.0	36.0	102.0	-66.0	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
35	88.510M	27.6	+0.1	+0.5	+0.5	+6.8	+0.0	35.5	102.0	-66.5	Vert
	QP		+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
^	88.460M	26.1	+0.1	+0.5	+0.5	+6.8	+0.0	34.0	102.0	-68.0	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
37	30.000M	18.8	+0.1	+0.3	+0.3	+15.9	+0.0	35.4	102.0	-66.6	Vert
	QP		+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
38	90.830M	27.0	+0.1	+0.5	+0.5	+7.0	+0.0	35.1	102.0	-66.9	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
39	152.200M	23.5	+0.2	+0.6	+0.7	+9.7	+0.0	34.7	102.0	-67.3	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
40	49.250M	26.8	+0.1	+0.4	+0.4	+6.9	+0.0	34.6	102.0	-67.4	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
41	154.740M	22.7	+0.2	+0.6	+0.7	+10.2	+0.0	34.4	102.0	-67.6	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
42	48.400M	23.7	+0.1	+0.4	+0.4	+7.1	+0.0	31.7	102.0	-70.3	Vert
	QP		+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
^	48.400M	29.8	+0.1	+0.4	+0.4	+7.1	+0.0	37.8	102.0	-64.2	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					

44	53.970M	21.0	+0.1	+0.4	+0.4	+6.5	+0.0	28.4	102.0	-73.6	Horiz
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
45	59.917M	17.4	+0.1	+0.4	+0.4	+6.7	+0.0	25.0	102.0	-77.0	Horiz
	QP		+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
46	1830.255M	29.3	+0.0	+0.0	+0.0	+0.0	+0.0	28.7	110.0	-81.3	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			200k OFDM		
			+26.6	+0.7	+5.9	+0.7					
47	1830.405M	29.0	+0.0	+0.0	+0.0	+0.0	+0.0	28.4	110.0	-81.6	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			600k OFDM		
			+26.6	+0.7	+5.9	+0.7					
48	1829.700M	29.0	+0.0	+0.0	+0.0	+0.0	+0.0	28.4	110.0	-81.6	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			1.2M OFDM		
			+26.6	+0.7	+5.9	+0.7					
49	1804.861M	29.1	+0.0	+0.0	+0.0	+0.0	+0.0	28.3	110.0	-81.7	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			200k OFDM		
			+26.4	+0.7	+5.9	+0.7					
50	1804.820M	29.1	+0.0	+0.0	+0.0	+0.0	+0.0	28.3	110.0	-81.7	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			600k OFDM		
			+26.4	+0.7	+5.9	+0.7					
51	1855.237M	27.9	+0.0	+0.0	+0.0	+0.0	+0.0	27.5	110.0	-82.5	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			200k OFDM		
			+26.8	+0.7	+5.9	+0.7					
52	1855.060M	27.9	+0.0	+0.0	+0.0	+0.0	+0.0	27.5	110.0	-82.5	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			600k OFDM		
			+26.8	+0.7	+5.9	+0.7					
53	1853.610M	27.9	+0.0	+0.0	+0.0	+0.0	+0.0	27.5	110.0	-82.5	Vert
	Ave		+0.0	+0.0	+0.0	-34.5			1.2M OFDM		
			+26.8	+0.7	+5.9	+0.7					
54	1902.500M	26.2	+0.0	+0.0	+0.0	+0.0	+0.0	26.5	110.0	-83.5	Vert
	Ave		+0.0	+0.0	+0.0	-34.4			1.2M OFDM		
			+27.3	+0.7	+5.9	+0.8					
55	18.873M	27.3	+0.0	+0.0	+0.0	+0.0	-40.0	-4.3	102.0	-106.3	Para
	QP		+0.2	+8.2	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
^	18.873M	31.2	+0.0	+0.0	+0.0	+0.0	-40.0	-0.4	102.0	-102.4	Para
			+0.2	+8.2	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
57	1.868M	23.8	+0.0	+0.0	+0.0	+0.0	-40.0	-6.4	102.0	-108.4	Para
			+0.1	+9.7	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
58	29.370M	26.9	+0.1	+0.0	+0.0	+0.0	-40.0	-6.9	102.0	-108.9	Para
			+0.3	+5.8	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
59	24.632M	21.2	+0.1	+0.0	+0.0	+0.0	-40.0	-11.3	102.0	-113.3	Groun
			+0.3	+7.1	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
60	16.144M	19.5	+0.0	+0.0	+0.0	+0.0	-40.0	-11.5	102.0	-113.5	Perp
			+0.2	+8.8	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					

Test Location:	CKC Laboratories • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**101674**	Date:	8/28/2018
Test Type:	**Radiated Scan**	Time:	11:04:00
Tested By:	Michael Atkinson	Sequence#:	7
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 4			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 4			

Test Conditions / Notes:

Frequency Range: 9kHz-9.28GHz
Frequency tested: Low, Mid, High Channels
Firmware power setting: Max
Firmware: CAM3-DEV Major Number 4, Minor Number 7, Build Number 153, Revision Number 787268
Test Software: CAM3 FCC Test Helper v14

Modulation Types:
10k GFSK, 50k GFSK, 150k GFSK
6.25k OQPSK, 12.5k OQPSK
200k OFDM, 600k OFDM, 1.2M OFDM (Hybrid)

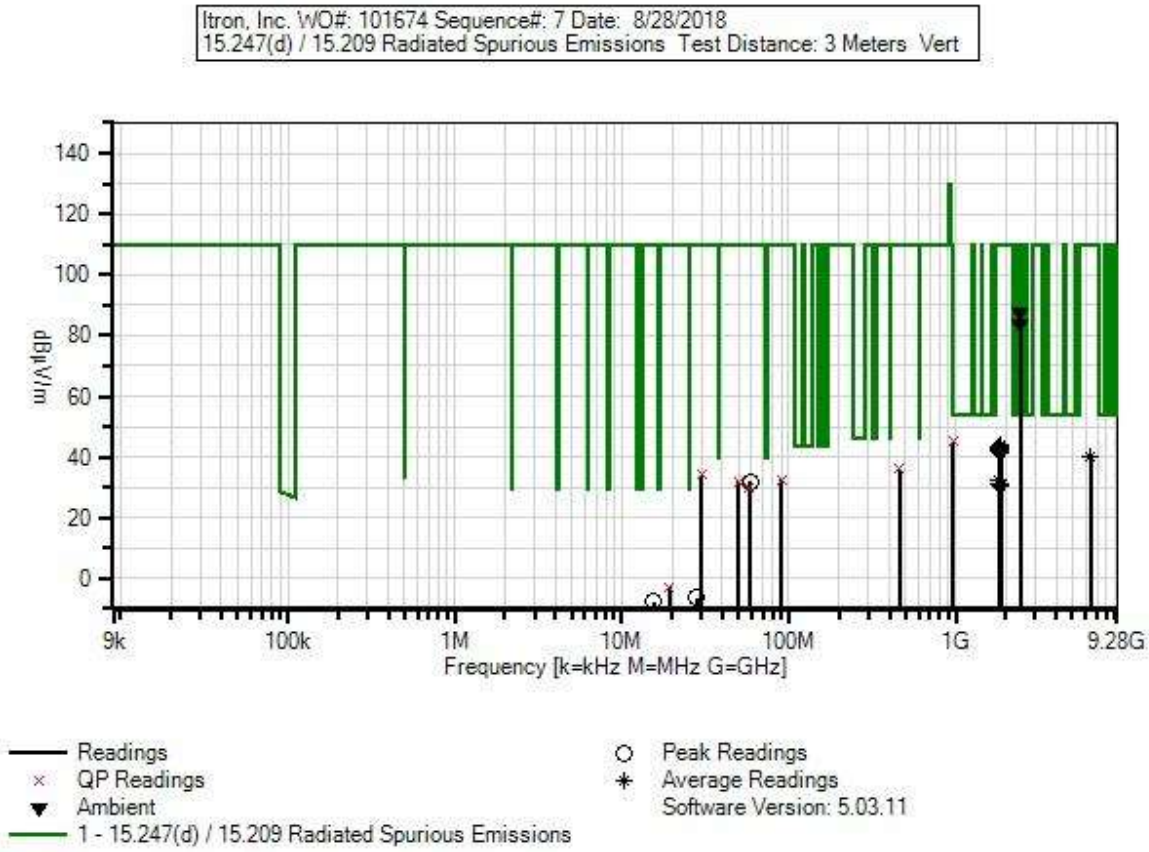
Antenna type: External Colinear Omni
Antenna Gain : 8.15dBi with 3dB attenuator (remote)

Duty Cycle: Tested at 100%

Test Location: Bothell Lab C3
Test Method: ANSI C63.10 (2013)
Temperature (ºC): 22-24
Relative Humidity (%): 38-42

Setup: The EUT is continuously transmitting with modulation on ISM port.
The EUT is connected to external antenna.
Low, Mid, and High channels investigated, worst case reported.
All modulation types investigated.
Horizontal and Vertical measurement antennas investigated above 30MHz, worst case reported.
3 orthogonal axes investigated below 30MHz, worst case reported.
Note: Base of external antenna is below 1.5m height for testing above 1GHz, this is to keep antenna inside of test volume.
Fundamental of separate Wi-Fi module marked as ambient, and is to be ignored for this measurement.

No additional peak emissions observed within 20dB of the peak limit.


Itron, Inc. WO#: 101674 Sequence#: 7 Date: 8/28/2018
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert
140
120
100
80
60
40
20
0
dBuV/m
9k
100k
1M
10M
100M
1G
9.28G
Frequency [k=kHz M=MHz G=GHz]
Readings
QP Readings
Ambient
1 - 15.247(d) / 15.209 Radiated Spurious Emissions
Peak Readings
Average Readings
Software Version: 5.03.11

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06540	Cable	Heliax	10/30/2017	10/30/2019
T2	ANP05305	Cable	ETSI-50T	10/24/2017	10/24/2019
T3	ANP05360	Cable	RG214	1/31/2018	1/31/2020
T4	AN03628	Biconilog Antenna	3142E	6/7/2017	6/7/2019
T5	ANP06515	Cable	Heliax	6/29/2018	6/29/2020
T6	AN00052	Loop Antenna	6502	5/7/2018	5/7/2020
T7	AN02871	Spectrum Analyzer	E4440A	2/24/2017	2/24/2019
T8	AN03540	Preamp	83017A	5/2/2017	5/2/2019
T9	ANP06934	Cable	32026-29801-29801-18	3/13/2018	3/13/2020
T10	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	7/21/2017	7/21/2019
T11	AN03170	High Pass Filter	HM1155-11SS	11/27/2017	11/27/2019
T12	ANP07226	Attenuator	PE7004-6	12/1/2017	12/1/2019
T13	ANP06503	Cable	32026-29801-29801-36	3/13/2018	3/13/2020

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9 T13	T2 T6 T10	T3 T7 T11	T4 T8 T12	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	963.678M QP	14.5	+0.4 +1.7 +0.0 +0.0	+1.6 +0.0 +0.0	+2.1 +0.0 +0.0	+24.8 +0.0 +0.0	+0.0	45.1	54.0 10k GFSK	-8.9	Vert
2	2434.000M Ambient	84.7	+0.4 +2.6 +0.4 +0.0	+0.0 +0.0 +28.1	+0.0 +0.0 +0.6	+0.0 -34.0 +5.8	+0.0	87.7	102.0	-14.3	Vert
3	2434.000M Ambient	80.7	+0.4 +2.6 +0.4 +0.0	+0.0 +0.0 +28.1	+0.0 +0.0 +0.6	+0.0 -34.0 +5.8	+0.0	83.7	102.0	-18.3	Horiz
4	1830.060M Ave	41.5	+0.4 +2.3 +0.3 +0.0	+0.0 +0.0 +26.6	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	44.2	102.0 10k GFSK	-57.8	Vert
5	1830.180M Ave	40.6	+0.4 +2.3 +0.3 +0.0	+0.0 +0.0 +26.6	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	43.3	102.0 50k GFSK	-58.7	Vert
6	1804.247M Ave	40.4	+0.5 +2.2 +0.3 +0.0	+0.0 +0.0 +26.3	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	43.1	102.0 12.5 OQPSK	-58.9	Vert

7	1804.395M Ave	40.2	+0.5 +2.2 +0.3 +0.0	+0.0 +0.0 +26.4	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	42.9	102.0 150k GFSK	-59.1	Vert
8	1804.438M Ave	40.2	+0.5 +2.2 +0.3 +0.0	+0.0 +0.0 +26.4	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	42.9	102.0 6.25k OQPSK	-59.1	Vert
9	1804.800M Ave	40.1	+0.5 +2.2 +0.3 +0.0	+0.0 +0.0 +26.4	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	42.8	102.0 50k GFSK	-59.2	Vert
10	1830.022M Ave	42.6	+0.4 +0.0 +0.0 +0.7	+0.0 +0.0 +26.6	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	42.4	102.0	-59.6	Vert
11	1831.144M Ave	39.6	+0.4 +2.3 +0.3 +0.0	+0.0 +0.0 +26.6	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	42.3	102.0 12.5 OQPSK	-59.7	Vert
12	1855.514M Ave	39.6	+0.4 +2.3 +0.3 +0.0	+0.0 +0.0 +26.9	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	42.3	102.0 10k GFSK	-59.7	Vert
13	1830.244M Ave	39.6	+0.4 +2.3 +0.3 +0.0	+0.0 +0.0 +26.6	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	42.3	102.0 6.25k OQPSK	-59.7	Vert
14	1855.246M Ave	39.5	+0.4 +2.3 +0.3 +0.0	+0.0 +0.0 +26.8	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	42.2	102.0 50k GFSK	-59.8	Vert
15	1830.292M Ave	39.5	+0.4 +2.3 +0.3 +0.0	+0.0 +0.0 +26.6	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	42.2	102.0 150k GFSK	-59.8	Vert
16	1804.360M Ave	39.1	+0.5 +2.2 +0.3 +0.0	+0.0 +0.0 +26.3	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	41.8	102.0 10k GFSK	-60.2	Vert
17	1855.225M Ave	38.9	+0.4 +2.3 +0.3 +0.0	+0.0 +0.0 +26.8	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	41.6	102.0 150k GFSK	-60.4	Vert
18	1855.258M Ave	38.9	+0.4 +2.3 +0.3 +0.0	+0.0 +0.0 +26.8	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	41.6	102.0 6.25k OQPSK	-60.4	Vert
19	1855.234M Ave	38.9	+0.4 +2.3 +0.3 +0.0	+0.0 +0.0 +26.8	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	41.6	102.0 12.5k OQPSK	-60.4	Vert

20	6409.000M Ave	25.3	+0.6 +5.4 +0.8 +0.0	+0.0 +0.0 +35.4	+0.0 +0.0 +0.5	+0.0 -33.6 +5.9	+0.0	40.3	102.0	-61.7	Vert
^	6409.000M	36.0	+0.6 +5.4 +0.8 +0.0	+0.0 +0.0 +35.4	+0.0 +0.0 +0.5	+0.0 -33.6 +5.9	+0.0	51.0	102.0	-51.0	Vert
22	462.400M QP	14.5	+0.2 +1.1 +0.0 +0.0	+1.1 +0.0 +0.0	+1.3 +0.0 +0.0	+17.9 +0.0 +0.0	+0.0	36.1	102.0	-65.9	Vert
^	462.400M	19.7	+0.2 +1.1 +0.0 +0.0	+1.1 +0.0 +0.0	+1.3 +0.0 +0.0	+17.9 +0.0 +0.0	+0.0	41.3	102.0	-60.7	Vert
24	30.000M QP	17.3	+0.1 +0.3 +0.0 +0.0	+0.3 +0.0 +0.0	+0.3 +0.0 +0.0	+15.9 +0.0 +0.0	+0.0	34.2	102.0	-67.8	Vert
25	89.900M QP	24.2	+0.1 +0.5 +0.0 +0.0	+0.5 +0.0 +0.0	+0.5 +0.0 +0.0	+6.9 +0.0 +0.0	+0.0	32.7	102.0	-69.3	Vert
^	89.900M	26.4	+0.1 +0.5 +0.0 +0.0	+0.5 +0.0 +0.0	+0.5 +0.0 +0.0	+6.9 +0.0 +0.0	+0.0	34.9	102.0	-67.1	Vert
27	58.490M	23.9	+0.1 +0.4 +0.0 +0.0	+0.4 +0.0 +0.0	+0.4 +0.0 +0.0	+6.6 +0.0 +0.0	+0.0	31.8	102.0	-70.2	Horiz
28	50.300M QP	23.7	+0.1 +0.4 +0.0 +0.0	+0.4 +0.0 +0.0	+0.4 +0.0 +0.0	+6.8 +0.0 +0.0	+0.0	31.8	102.0	-70.2	Vert
^	50.300M	26.8	+0.1 +0.4 +0.0 +0.0	+0.4 +0.0 +0.0	+0.4 +0.0 +0.0	+6.8 +0.0 +0.0	+0.0	34.9	102.0	-67.1	Vert
30	58.028M QP	21.7	+0.1 +0.4 +0.0 +0.0	+0.4 +0.0 +0.0	+0.4 +0.0 +0.0	+6.6 +0.0 +0.0	+0.0	29.6	102.0	-72.4	Horiz
31	1804.410M Ave	29.9	+0.5 +2.2 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	32.6	110.0 200k OFDM	-77.4	Vert
32	1804.313M Ave	29.8	+0.5 +2.2 +0.3 +0.0	+0.0 +0.0 +26.3	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	31.2	110.0 600k OFDM	-78.8	Vert

33	1805.620M Ave	29.7	+0.5 +2.2 +0.3 +0.0	+0.0 +0.0 +26.4	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	31.2	110.0 1.2M OFDM	-78.8	Vert
34	1804.349M Ave	29.7	+0.5 +2.2 +0.3 +0.0	+0.0 +0.0 +26.3	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	31.1	110.0 600k OFDM	-78.9	Vert
35	1804.360M Ave	29.7	+0.5 +2.2 +0.3 +0.0	+0.0 +0.0 +26.3	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	31.1	110.0 200k OFDM	-78.9	Vert
36	1829.660M Ave	29.2	+0.4 +2.3 +0.3 +0.0	+0.0 +0.0 +26.6	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	30.9	110.0 1.2M OFDM	-79.1	Vert
37	1855.239M Ave	28.7	+0.4 +2.3 +0.3 +0.0	+0.0 +0.0 +26.8	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	30.6	110.0 200k OFDM	-79.4	Vert
38	1855.192M Ave	28.7	+0.4 +2.3 +0.3 +0.0	+0.0 +0.0 +26.8	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	30.6	110.0 600k OFDM	-79.4	Vert
39	1853.600M Ave	28.6	+0.4 +2.3 +0.3 +0.0	+0.0 +0.0 +26.8	+0.0 +0.0 +0.7	+0.0 -34.5 +5.9	+0.0	30.5	110.0 1.2M OFDM	-79.5	Vert
40	19.293M QP	28.9	+0.0 +0.2 +0.0 +0.0	+0.0 +8.1 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	-40.0	-2.8	102.0	-104.8	Para
^	19.293M	33.5	+0.0 +0.2 +0.0 +0.0	+0.0 +8.1 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	-40.0	1.8	102.0	-100.2	Para
42	28.051M	27.2	+0.1 +0.3 +0.0 +0.0	+0.0 +6.1 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	-40.0	-6.3	102.0	-108.3	Para
43	15.574M	23.2	+0.0 +0.2 +0.0 +0.0	+0.0 +9.0 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	-40.0	-7.6	102.0	-109.6	Groun
44	9.396M	19.6	+0.0 +0.2 +0.0 +0.0	+0.0 +9.2 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	-40.0	-11.0	102.0	-113.0	Perp
45	7.357M	17.1	+0.0 +0.1 +0.0 +0.0	+0.0 +9.4 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	-40.0	-13.4	102.0	-115.4	Para

Band Edge

Band Edge Summary – Configuration 2					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
614	10k GFSK	External Attached Colinear Omni 2.8dBi	39.9	<46	Pass
902			98.3	<110	Pass
928			81.5	<110	Pass
960			46.7	<54	Pass
614	50k GFSK	External Attached Colinear Omni 2.8dBi	38.7	<46	Pass
902			71.4	<110	Pass
928			72.9	<110	Pass
960			43.5	<54	Pass
614	150k GFSK	External Attached Colinear Omni 2.8dBi	38.7	<46	Pass
902			72.0	<110	Pass
928			73.8	<110	Pass
960			43.5	<54	Pass
614	6.25k OQPSK	External Attached Colinear Omni 2.8dBi	38.8	<46	Pass
902			71.7	<110	Pass
928			73.5	<110	Pass
960			43.6	<54	Pass
614	12.5 OQPSK	External Attached Colinear Omni 2.8dBi	38.7	<46	Pass
902			72.1	<110	Pass
928			73.2	<110	Pass
960			43.6	<54	Pass
614	200k OFDM	External Attached Colinear Omni 2.8dBi	38.7	<46	Pass
902			80.7	<102	Pass
928			82.2	<102	Pass
960			43.3	<54	Pass
614	600k OFDM	External Attached Colinear Omni 2.8dBi	38.7	<46	Pass
902			77.7	<102	Pass
928			73.8	<102	Pass
960			43.2	<54	Pass
614	1.2M OFDM (Hybrid)	External Attached Colinear Omni 2.8dBi	38.5	<46	Pass
902			61.0	<102	Pass
928			52.1	<102	Pass
960			43.2	<54	Pass
614	Hopping (10k GFSK)	External Attached Colinear Omni 2.8dBi	38.5	<46	Pass
902			74.2	<110	Pass
928			75.9	<110	Pass
960			43.1	<54	Pass
614	Hopping (6.25k OQPSK)	External Attached Colinear Omni 2.8dBi	38.5	<46	Pass
902			72.0	<110	Pass
928			64.7	<110	Pass
960			43.1	<54	Pass
614	Hopping (200k OFDM)	External Attached Colinear Omni 2.8dBi	38.6	<46	Pass
902			66.3	<102	Pass
928			64.7	<102	Pass

Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
960			43.2	<54	Pass
614	Hopping (1.2M OFDM) (Hybrid)	External Attached Colinear Omni 2.8dBi	38.5	<46	Pass
902			51.4	<102	Pass
928			47.3	<102	Pass
960			43.2	<54	Pass

Band Edge Summary – Configuration 3					
Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
614	10k GFSK	External Remote Colinear Omni 5.5dBI	38.8	<46	Pass
902			80.4	<110	Pass
928			77.3	<110	Pass
960			43.6	<54	Pass
614	50k GFSK	External Remote Colinear Omni 5.5dBI	38.8	<46	Pass
902			73.4	<110	Pass
928			70.8	<110	Pass
960			43.5	<54	Pass
614	150k GFSK	External Remote Colinear Omni 5.5dBI	38.9	<46	Pass
902			70.9	<110	Pass
928			72.8	<110	Pass
960			43.6	<54	Pass
614	6.25k OQPSK	External Remote Colinear Omni 5.5dBI	38.8	<46	Pass
902			72.3	<110	Pass
928			74.5	<110	Pass
960			43.5	<54	Pass
614	12.5 OQPSK	External Remote Colinear Omni 5.5dBI	38.8	<46	Pass
902			73.1	<110	Pass
928			73.4	<110	Pass
960			43.5	<54	Pass
614	200k OFDM	External Remote Colinear Omni 5.5dBI	38.7	<46	Pass
902			76.2	<102	Pass
928			72.9	<102	Pass
960			43.4	<54	Pass
614	600k OFDM	External Remote Colinear Omni 5.5dBI	38.8	<46	Pass
902			76.2	<102	Pass
928			72.7	<102	Pass
960			43.4	<54	Pass
614	1.2M OFDM (Hybrid)	External Remote Colinear Omni 5.5dBI	38.7	<46	Pass
902			59.5	<102	Pass
928			50.5	<102	Pass
960			43.4	<54	Pass
614	Hopping (10k GFSK)	External Remote Colinear Omni 5.5dBI	38.7	<46	Pass
902			74.4	<110	Pass
928			74.9	<110	Pass
960			43.4	<54	Pass

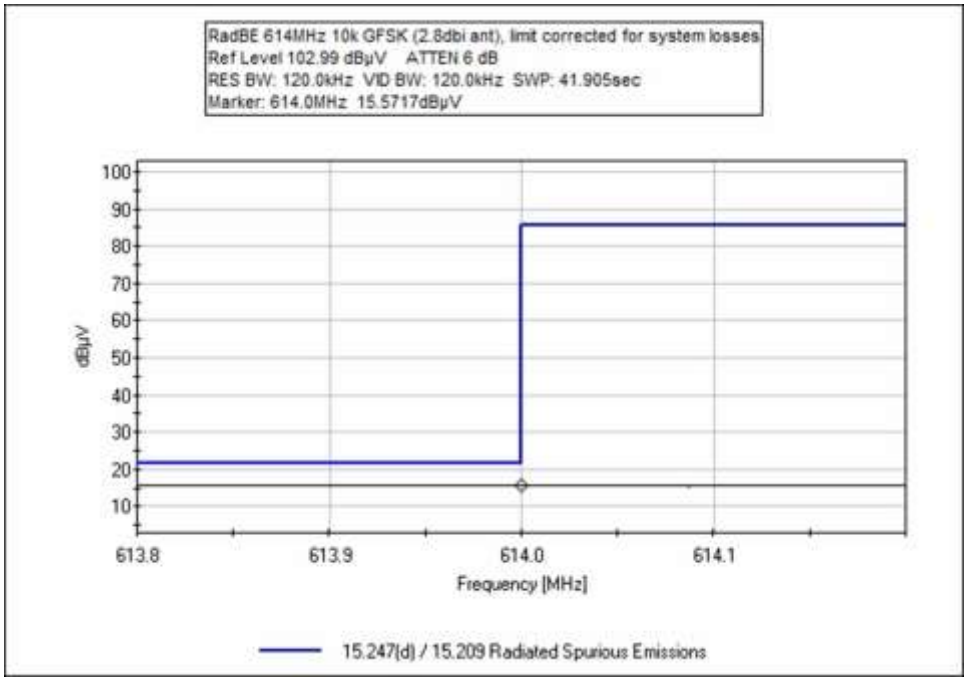
Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
614	Hopping (6.25k OQPSK)	External Remote Colinear Omni 5.5dBI	38.7	<46	Pass
902			65.3	<110	Pass
928			67.5	<110	Pass
960			43.5	<54	Pass
614	Hopping (200k OFDM)	External Remote Colinear Omni 5.5dBI	38.7	<46	Pass
902			70.3	<102	Pass
928			63.8	<102	Pass
960			43.5	<54	Pass
614	Hopping (1.2M OFDM) (Hybrid)	External Remote Colinear Omni 5.5dBI	38.8	<46	Pass
902			52.9	<102	Pass
928			47.5	<102	Pass
960			43.4	<54	Pass

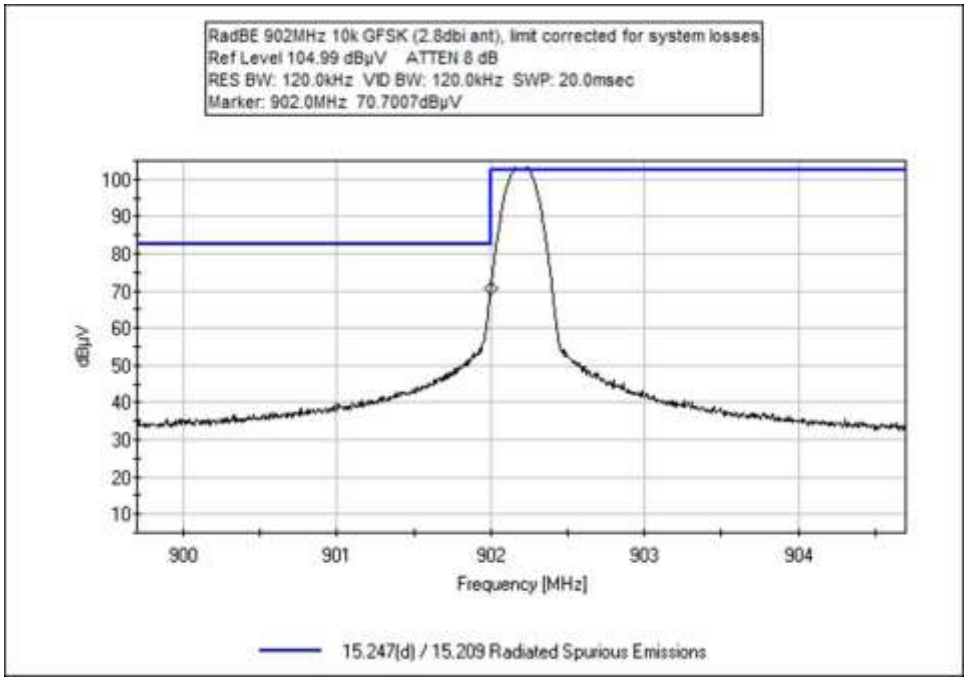
Band Edge Summary – Configuration 4					
Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
614	10k GFSK	External Remote Colinear Omni 8.15dBi with 3dB attenuator	38.9	<46	Pass
902			94.7	<110	Pass
928			76.55	<110	Pass
960			43.4	<54	Pass
614	50k GFSK	External Remote Colinear Omni 8.15dBi with 3dB attenuator	39.0	<46	Pass
902			71.0	<110	Pass
928			70.1	<110	Pass
960			43.4	<54	Pass
614	150k GFSK	External Remote Colinear Omni 8.15dBi with 3dB attenuator	38.9	<46	Pass
902			71.3	<110	Pass
928			71.0	<110	Pass
960			43.4	<54	Pass
614	6.25k OQPSK	External Remote Colinear Omni 8.15dBi with 3dB attenuator	38.9	<46	Pass
902			71.1	<110	Pass
928			71.2	<110	Pass
960			43.5	<54	Pass
614	12.5 OQPSK	External Remote Colinear Omni 8.15dBi with 3dB attenuator	38.9	<46	Pass
902			70.6	<110	Pass
928			71.7	<110	Pass
960			43.6	<54	Pass
614	200k OFDM	External Remote Colinear Omni 8.15dBi with 3dB attenuator	38.8	<46	Pass
902			73.4	<102	Pass
928			67.3	<102	Pass
960			43.5	<54	Pass
614	600k OFDM	External Remote Colinear Omni 8.15dBi with 3dB attenuator	38.8	<46	Pass
902			73.0	<102	Pass
928			65.8	<102	Pass
960			43.5	<54	Pass
614	1.2M OFDM	External Remote	38.8	<46	Pass

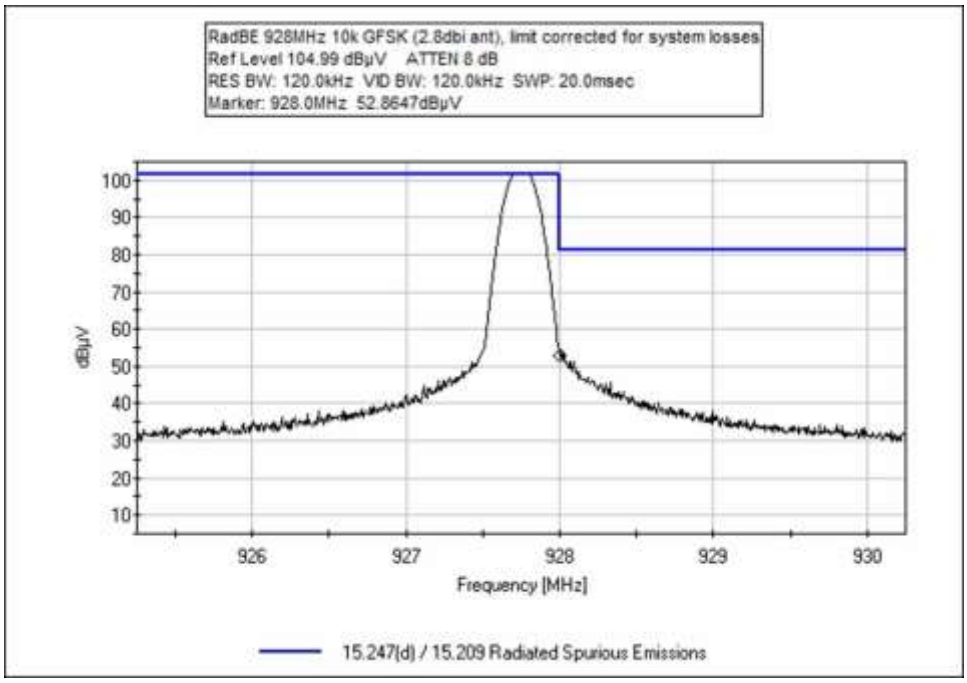
Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
902	(Hybrid)	Colinear Omni 8.15dBi with 3dB attenuator	58.2	<102	Pass
928			47.5	<102	Pass
960			43.5	<54	Pass
614	Hopping (10k GFSK)	External Remote Colinear Omni 8.15dBi with 3dB attenuator	38.7	<46	Pass
902			73.3	<110	Pass
928			70.9	<110	Pass
960			43.4	<54	Pass
614	Hopping (6.25k OQPSK)	External Remote Colinear Omni 8.15dBi with 3dB attenuator	38.8	<46	Pass
902			65.4	<110	Pass
928			67.2	<110	Pass
960			43.4	<54	Pass
614	Hopping (200k OFDM)	External Remote Colinear Omni 8.15dBi with 3dB attenuator	38.7	<46	Pass
902			67.9	<102	Pass
928			61.0	<102	Pass
960			43.5	<54	Pass
614	Hopping (1.2M OFDM) (Hybrid)	External Remote Colinear Omni 8.15dBi with 3dB attenuator	38.8	<46	Pass
902			55.4	<102	Pass
928			45.8	<102	Pass
960			43.5	<54	Pass

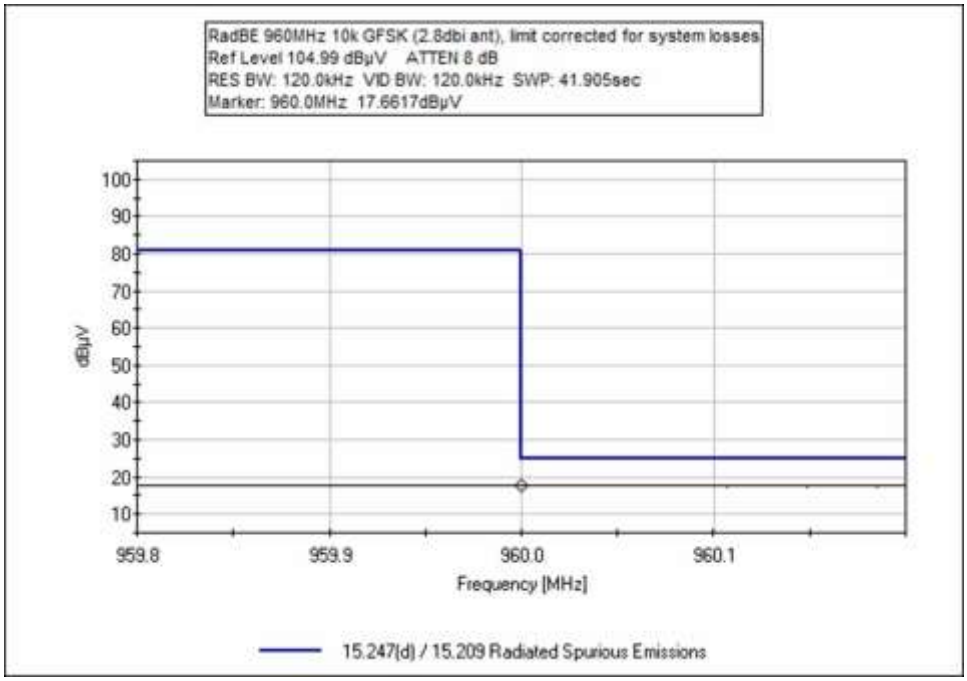
Band Edge Plots
Configuration 2

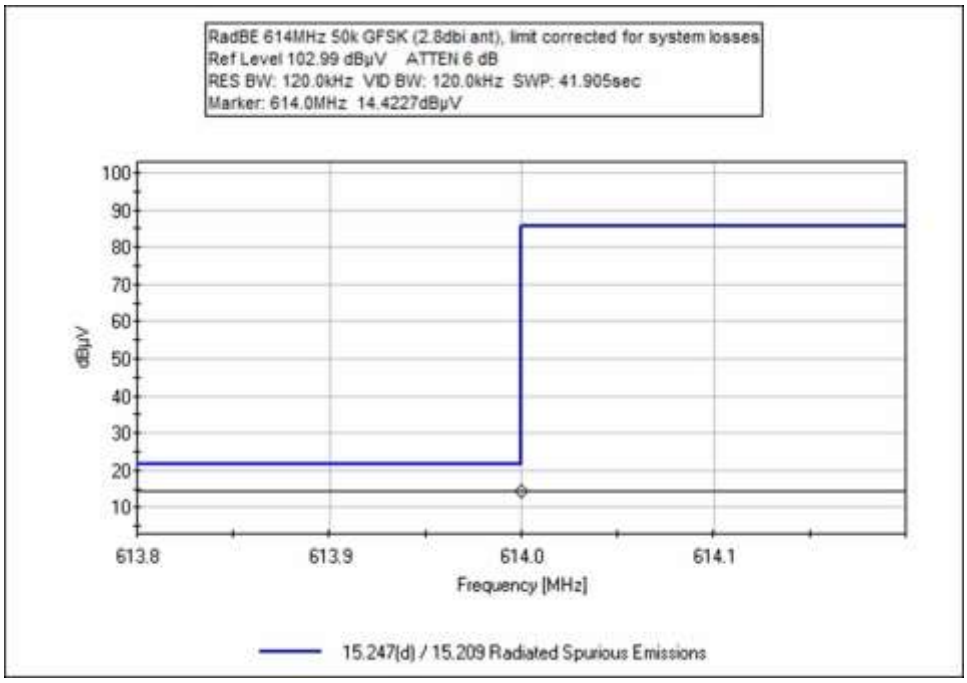
GFSK

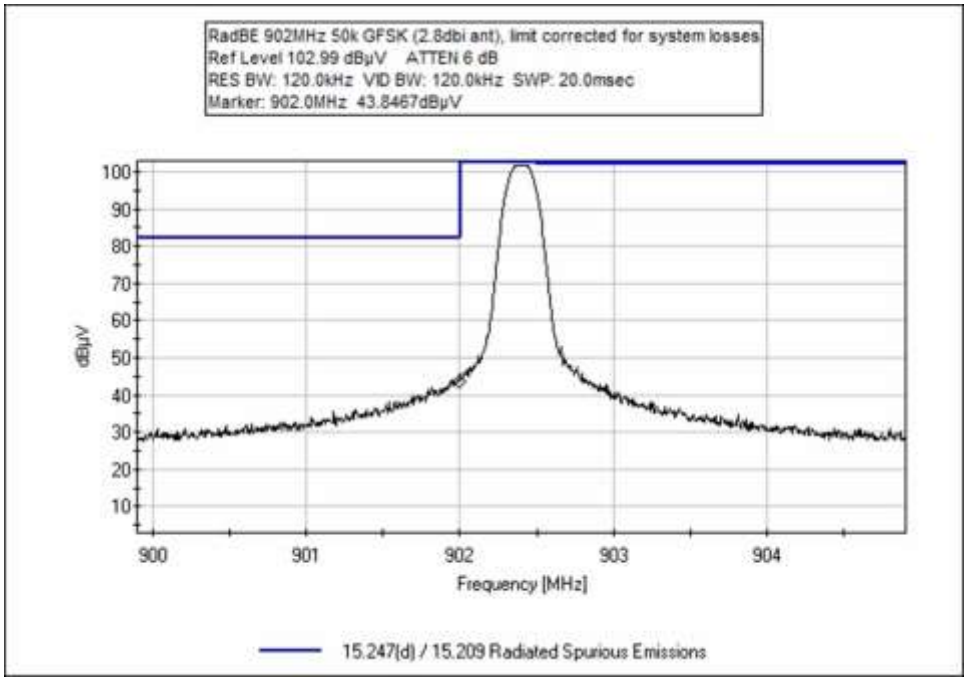


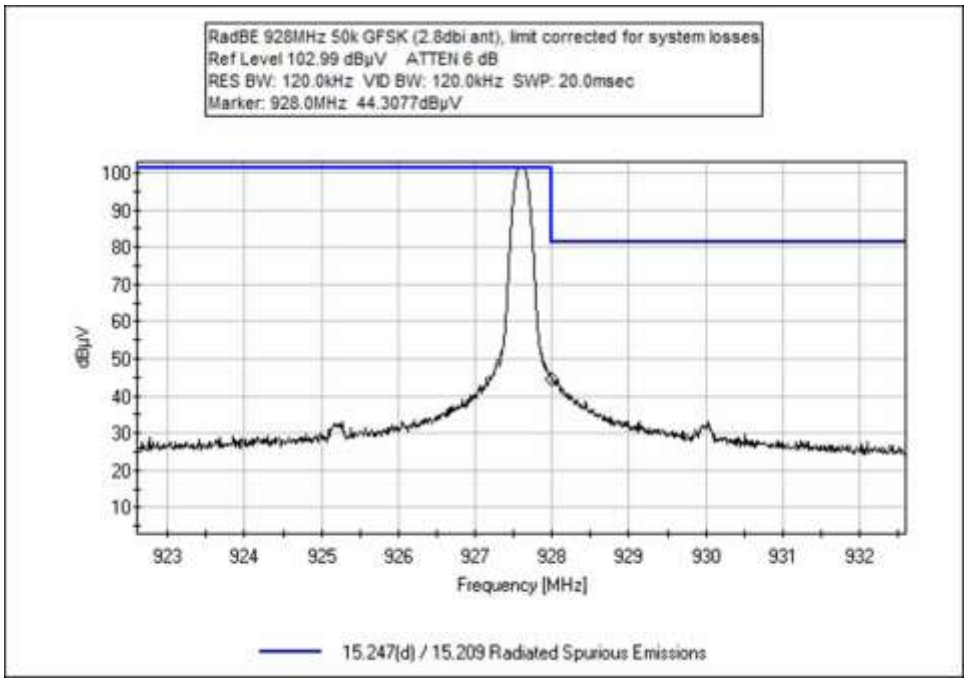


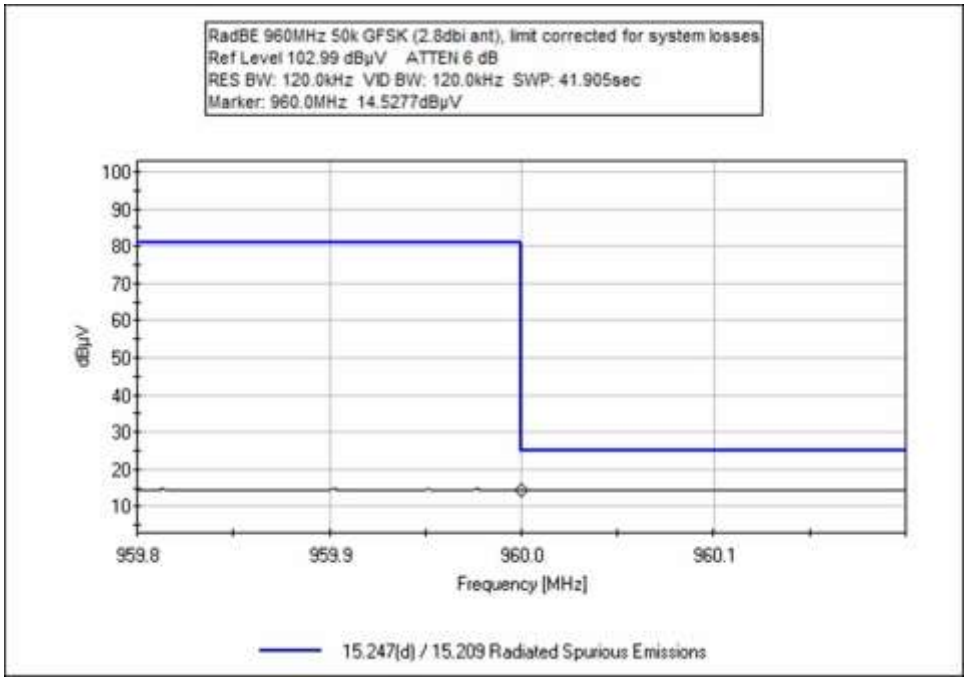

RadBE 928MHz 10k GFSK (2.8dbi ant), limit corrected for system losses
Ref Level 104.99 dBµV ATTEN 8 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 928.0MHz 52.8647dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

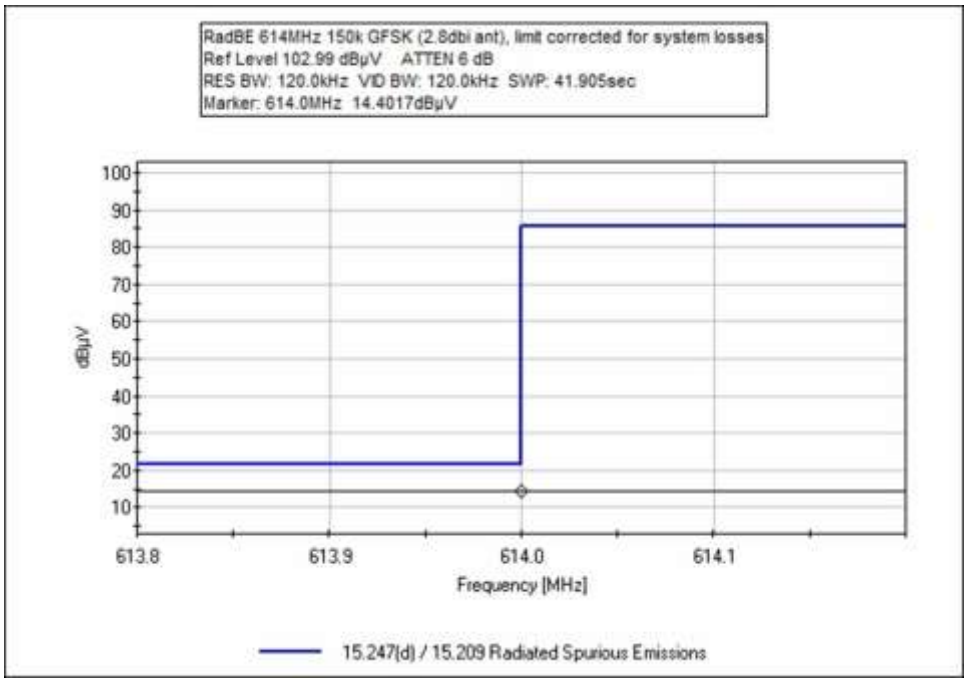

RadBE 960MHz 10k GFSK (2.8dbi ant), limit corrected for system losses
Ref Level 104.99 dBµV ATTEN 8 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 41.905sec
Marker: 960.0MHz 17.6617dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

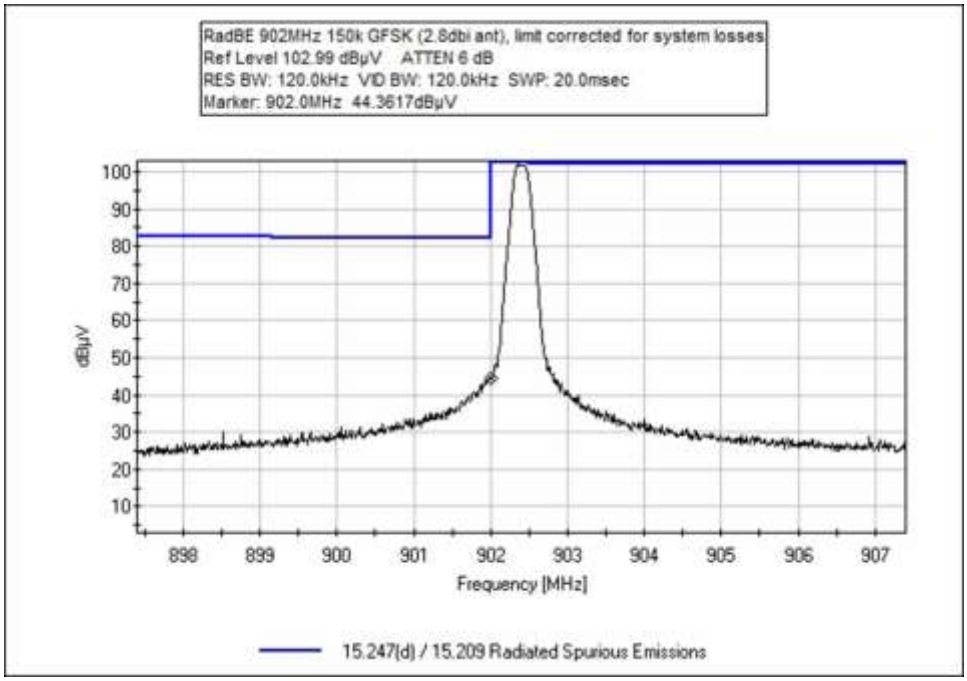

RadBE 614MHz 50k GFSK (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 41.905sec
Marker: 614.0MHz 14.4227dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

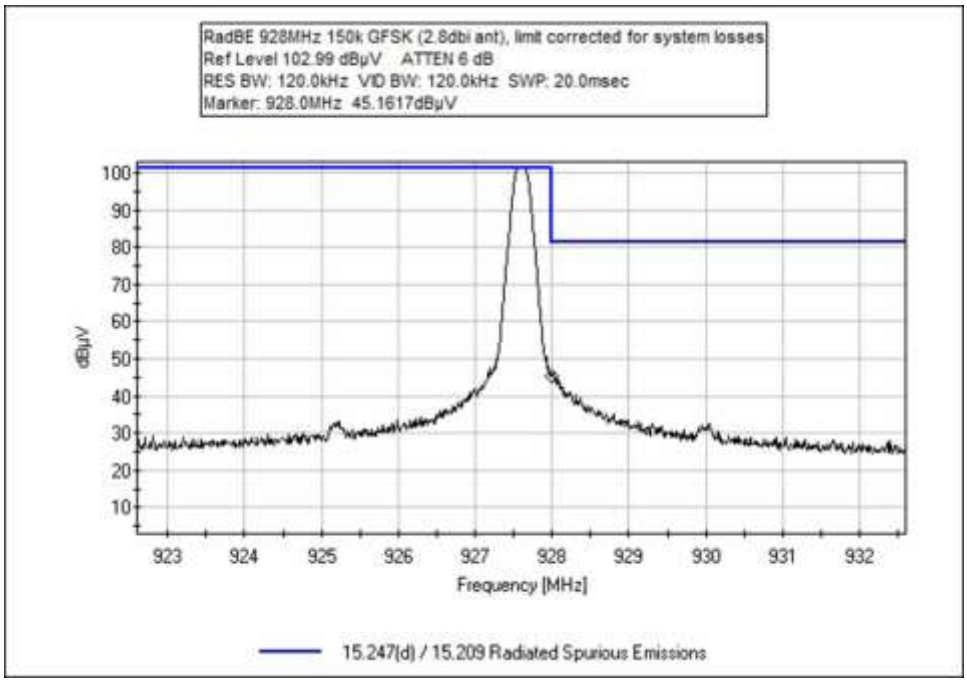

RadBE 902MHz 50k GFSK (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 902.0MHz 43.8467dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

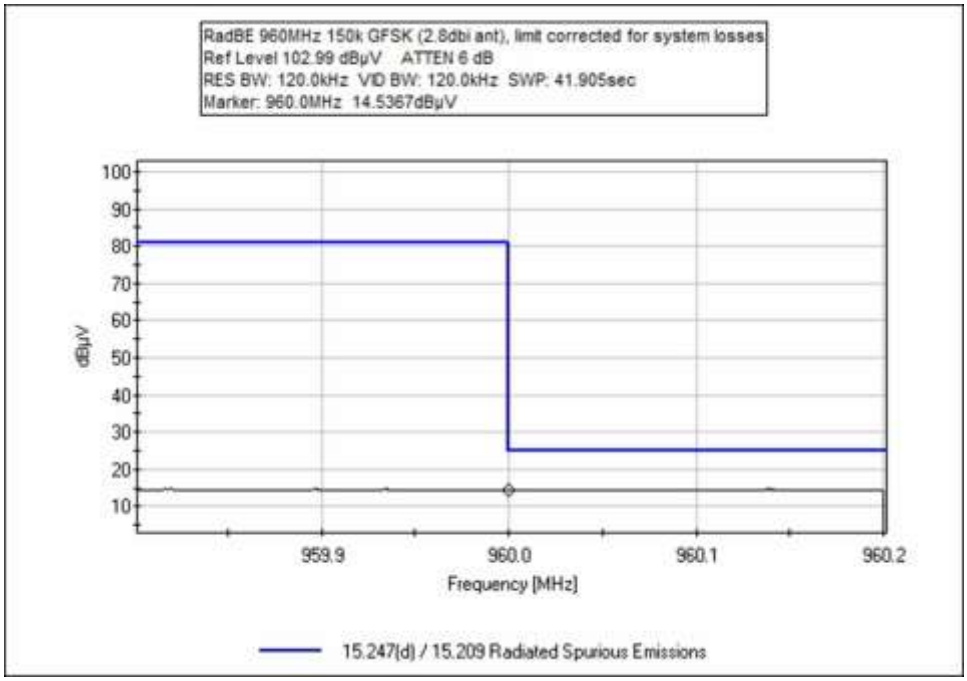

RadBE 928MHz 50k GFSK (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 928.0MHz 44.3077dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


RadBE 960MHz 50k GFSK (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 41.905sec
Marker: 960.0MHz 14.5277dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

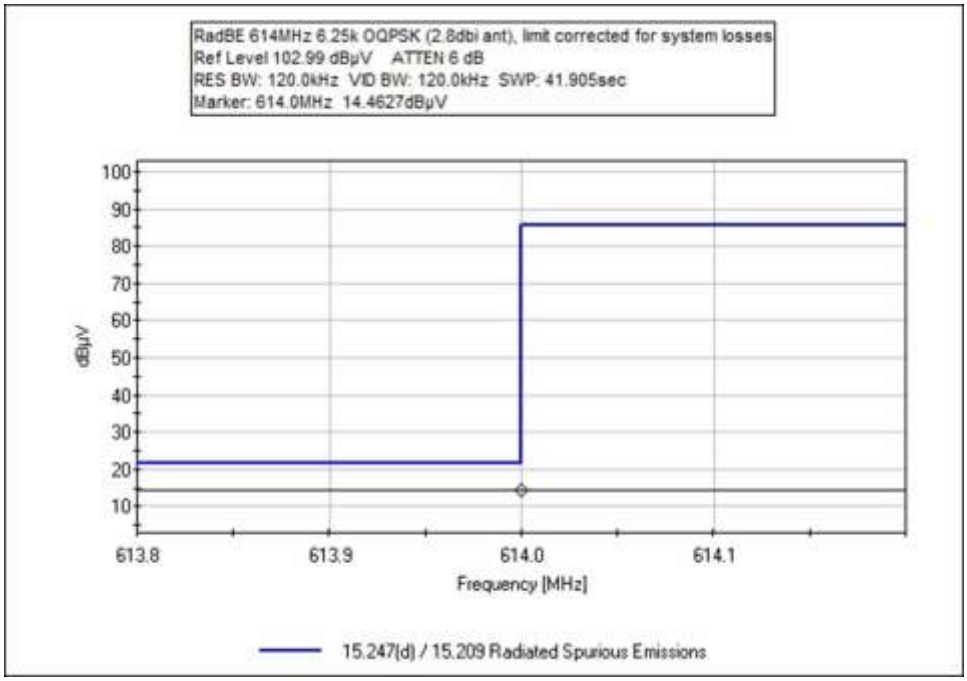

RadBE 614MHz 150k GFSK (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 41.905sec
Marker: 614.0MHz 14.4017dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
613.8
613.9
614.0
614.1
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

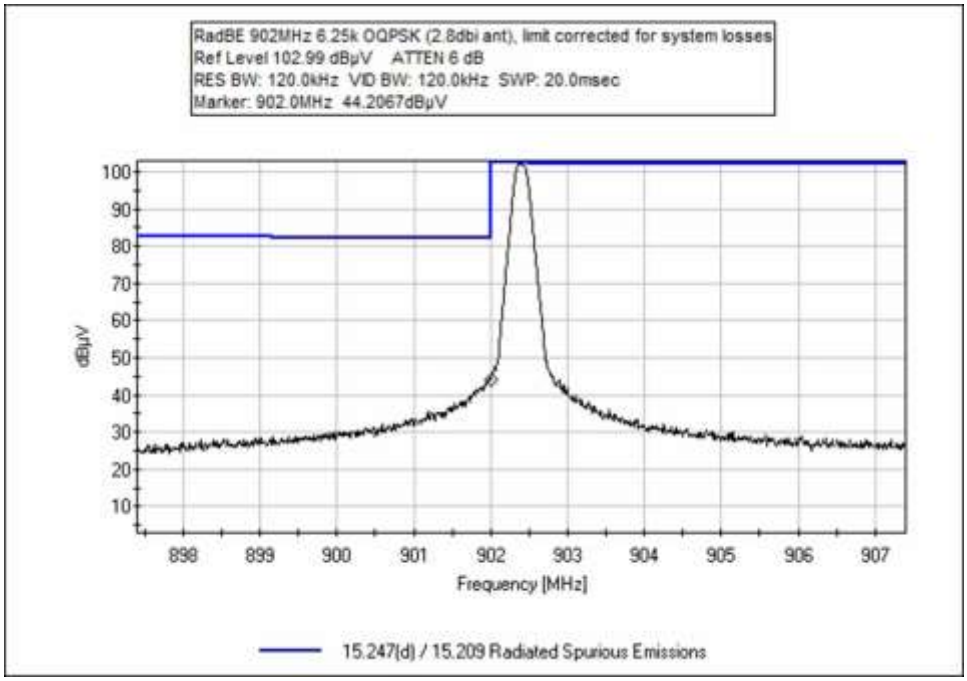

RadBE 902MHz 150k GFSK (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 902.0MHz 44.3617dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
898
899
900
901
902
903
904
905
906
907
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

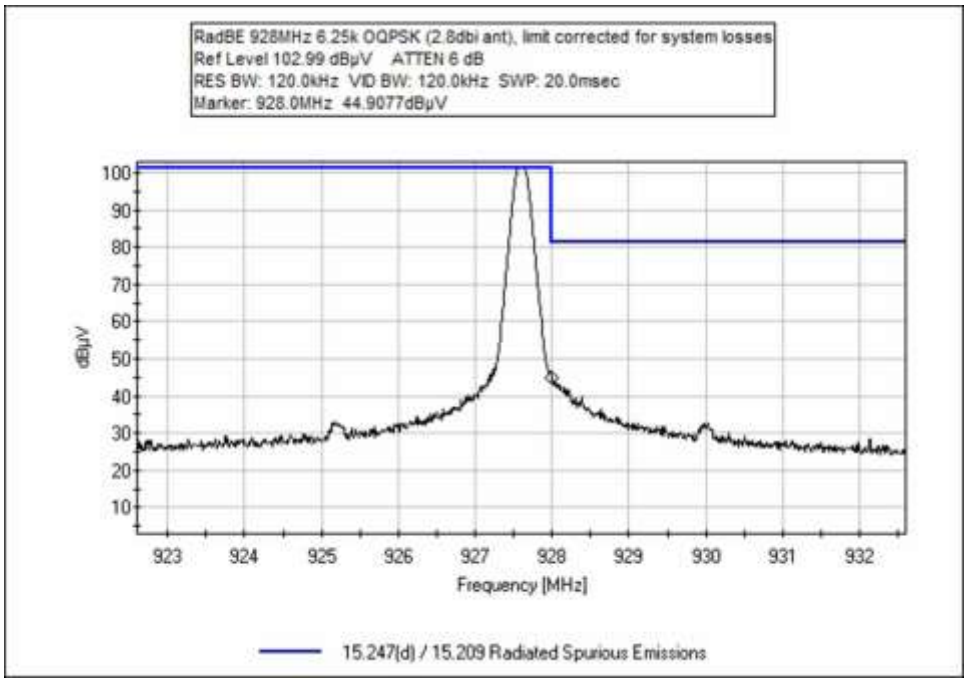

RadBE 928MHz 150k GFSK (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 928.0MHz 45.1617dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

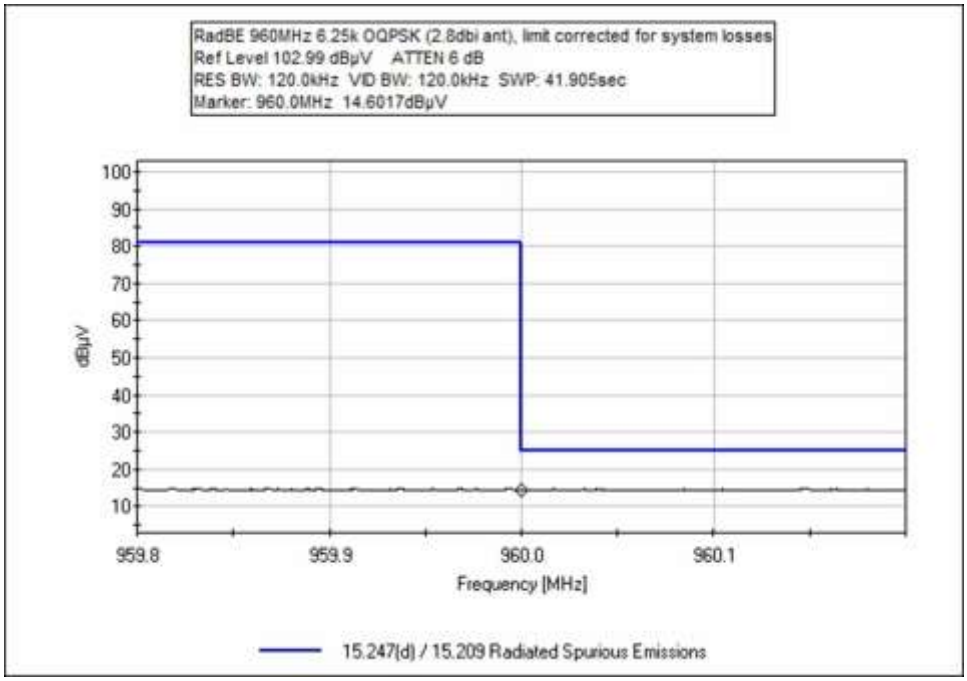

RadBE 960MHz 150k GFSK (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 41.905sec
Marker: 960.0MHz 14.5367dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

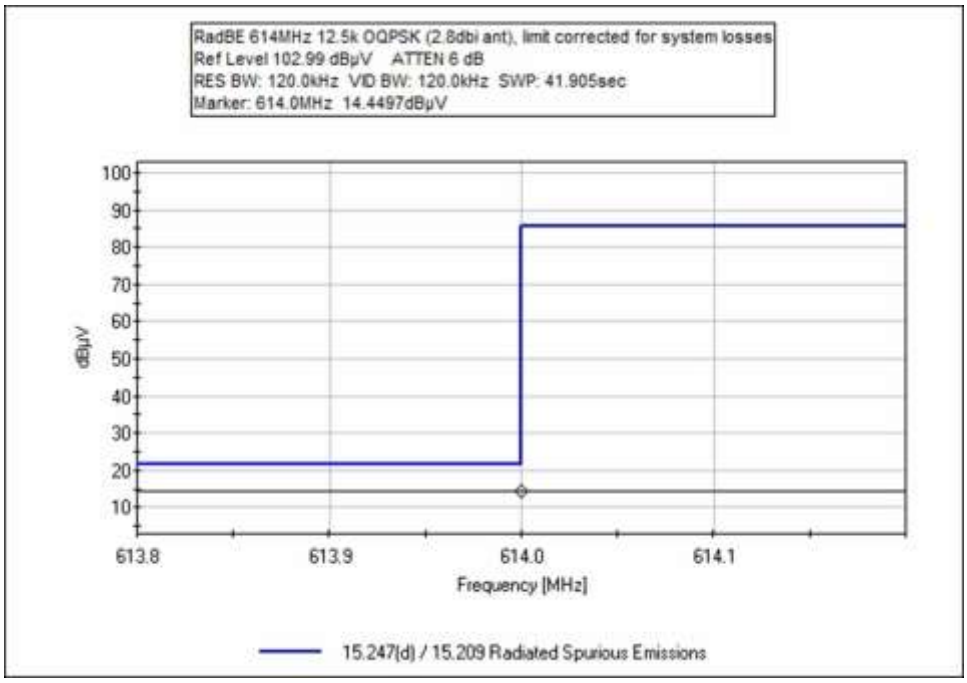
OQPSK

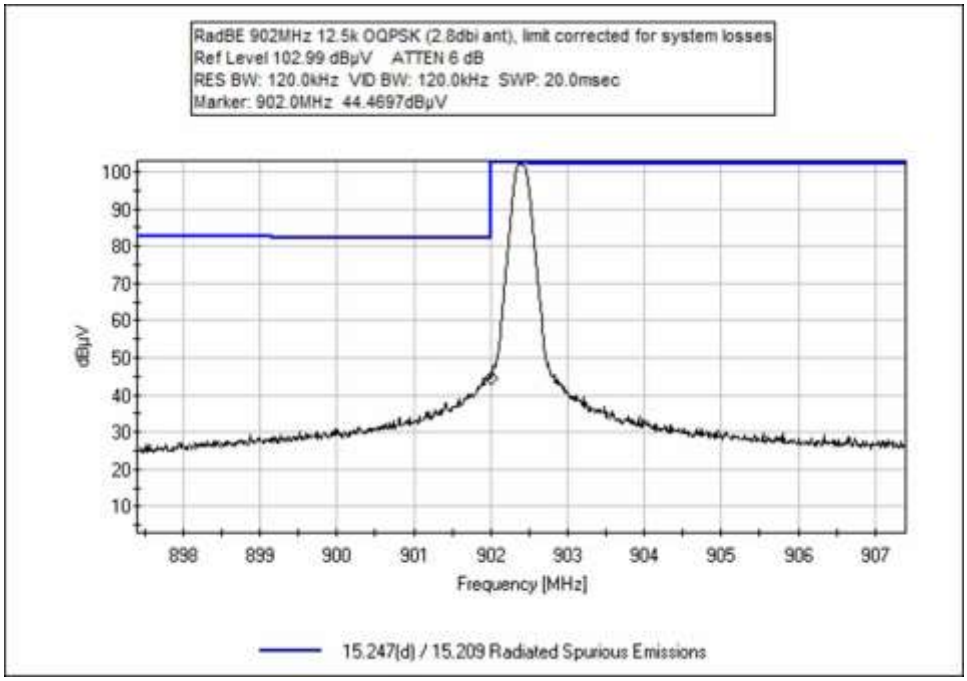

RadBE 614MHz 6.25k OQPSK (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 41.905sec
Marker: 614.0MHz 14.4627dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
613.8
613.9
614.0
614.1
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

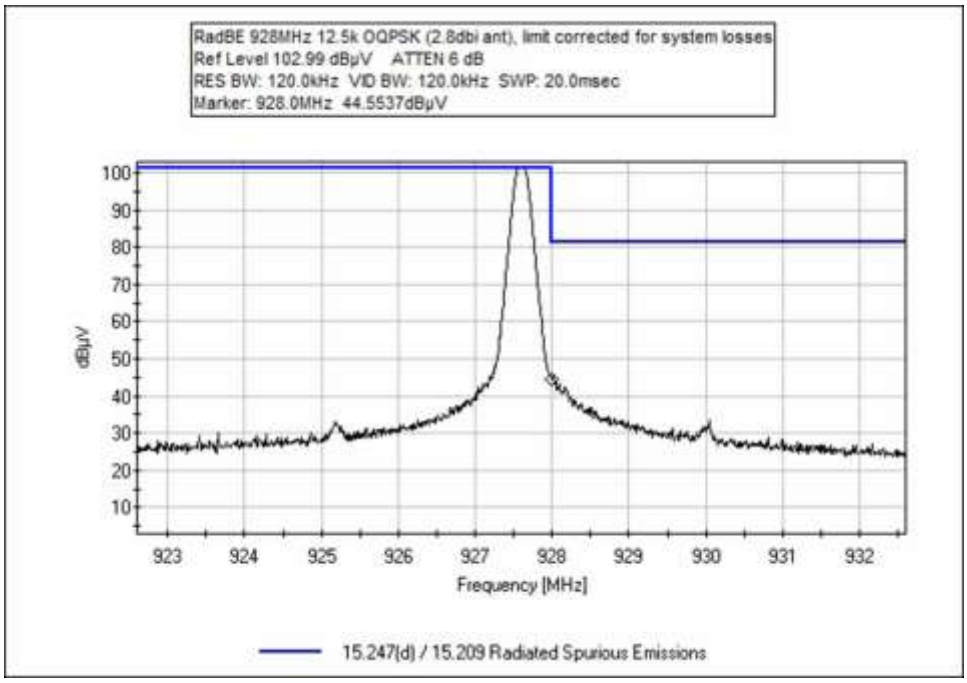

RadBE 902MHz 6.25k OQPSK (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 902.0MHz 44.2067dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
898
899
900
901
902
903
904
905
906
907
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

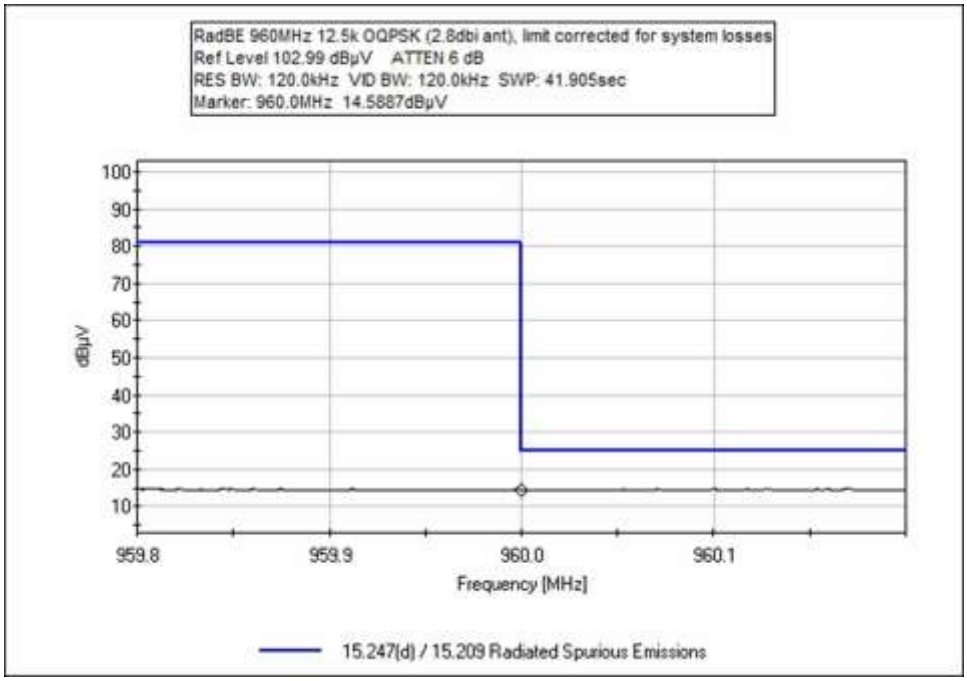

RadBE 928MHz 6.25k OQPSK (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 928.0MHz 44.9077dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


RadBE 960MHz 6.25k OQPSK (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 41.905sec
Marker: 960.0MHz 14.6017dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

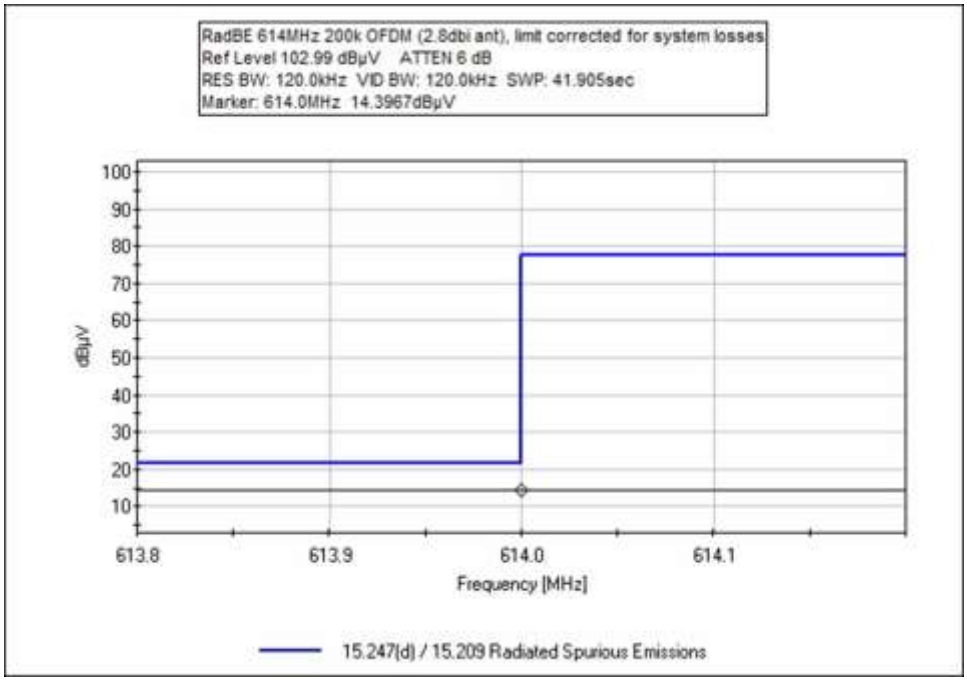

RadBE 614MHz 12.5k OQPSK (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 41.905sec
Marker: 614.0MHz 14.4497dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
613.8
613.9
614.0
614.1
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

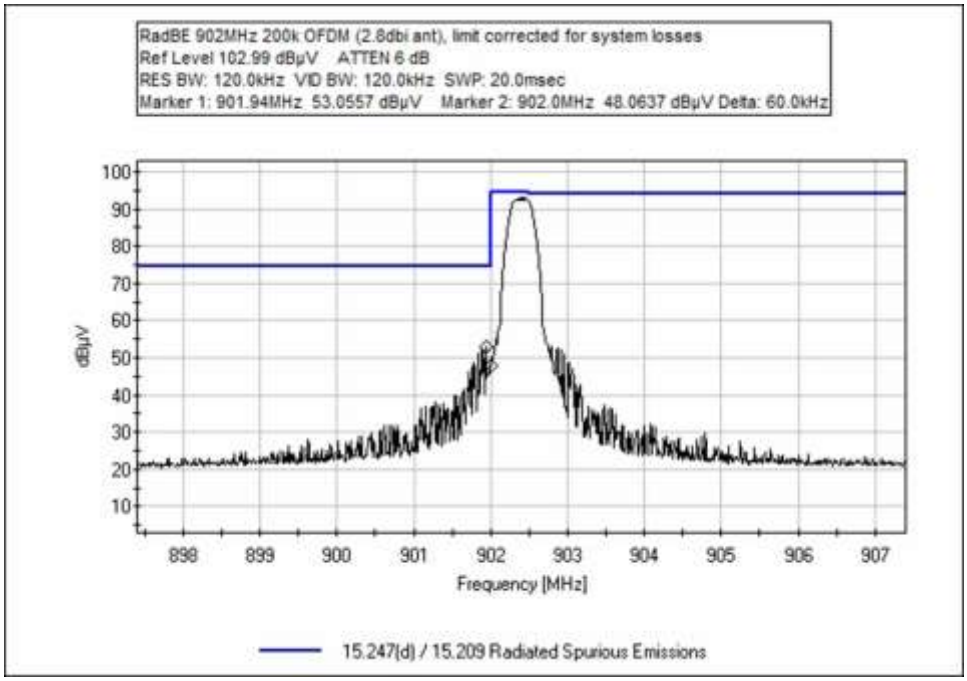

RadBE 902MHz 12.5k OQPSK (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 902.0MHz 44.4697dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
898
899
900
901
902
903
904
905
906
907
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

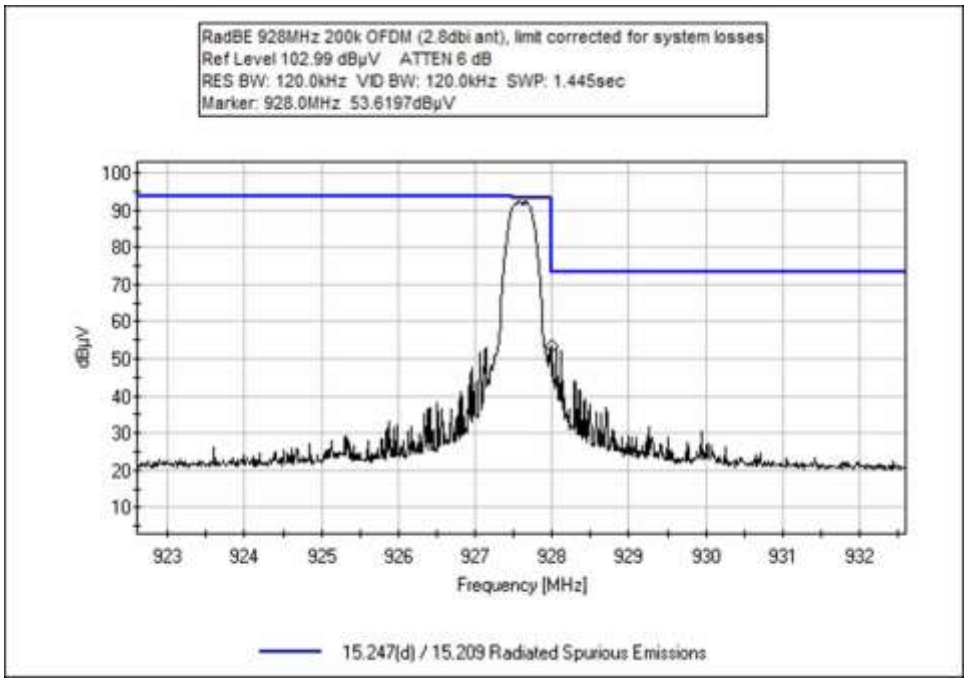

RadBE 928MHz 12.5k OQPSK (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 928.0MHz 44.5537dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

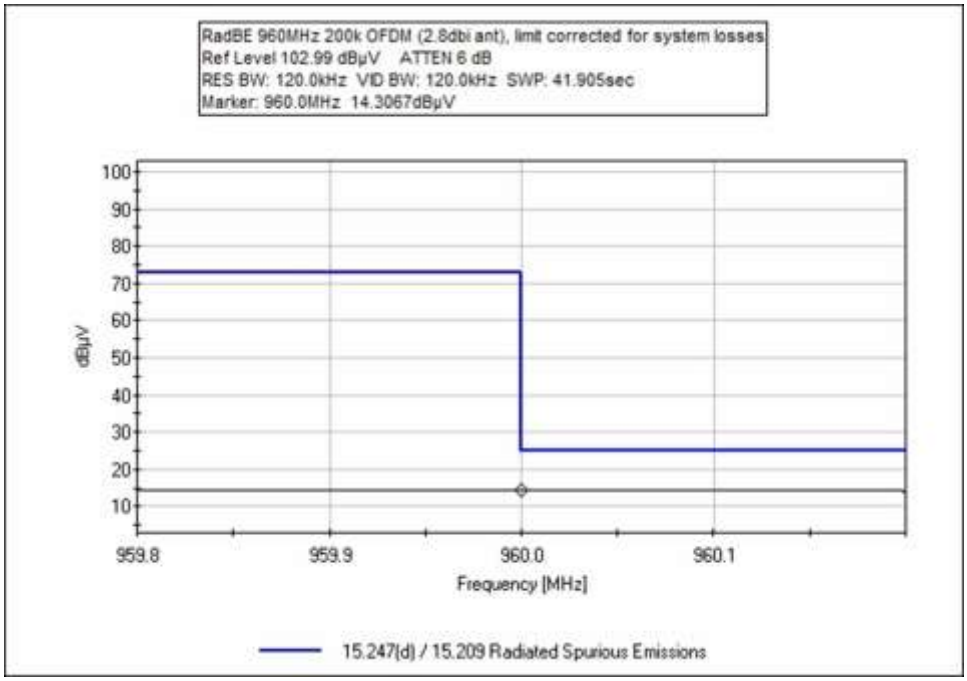

RadBE 960MHz 12.5k OQPSK (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 41.905sec
Marker: 960.0MHz 14.5887dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

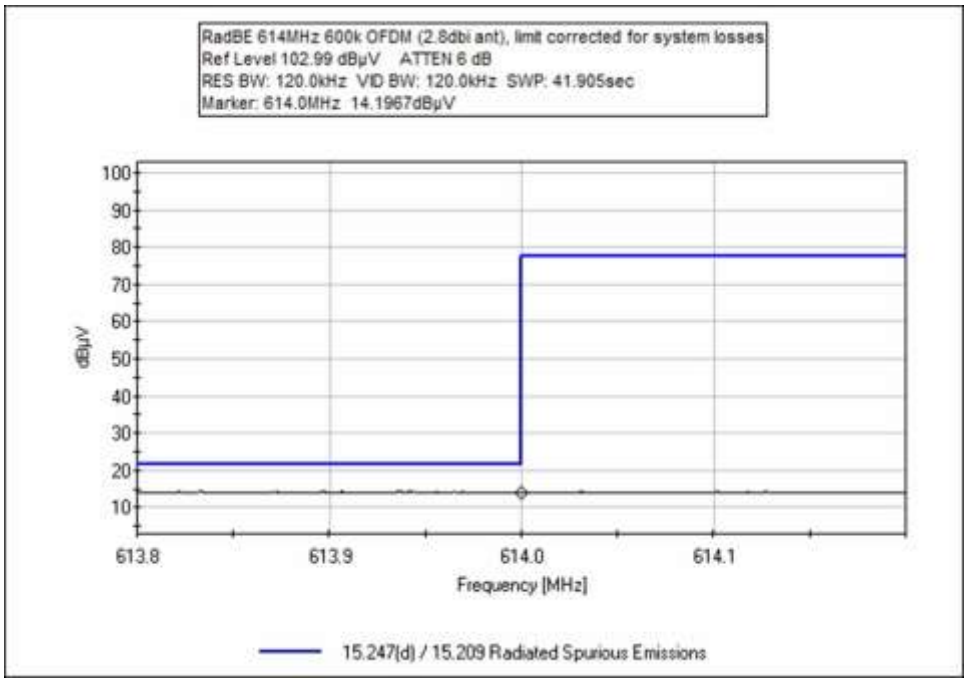
OFDM

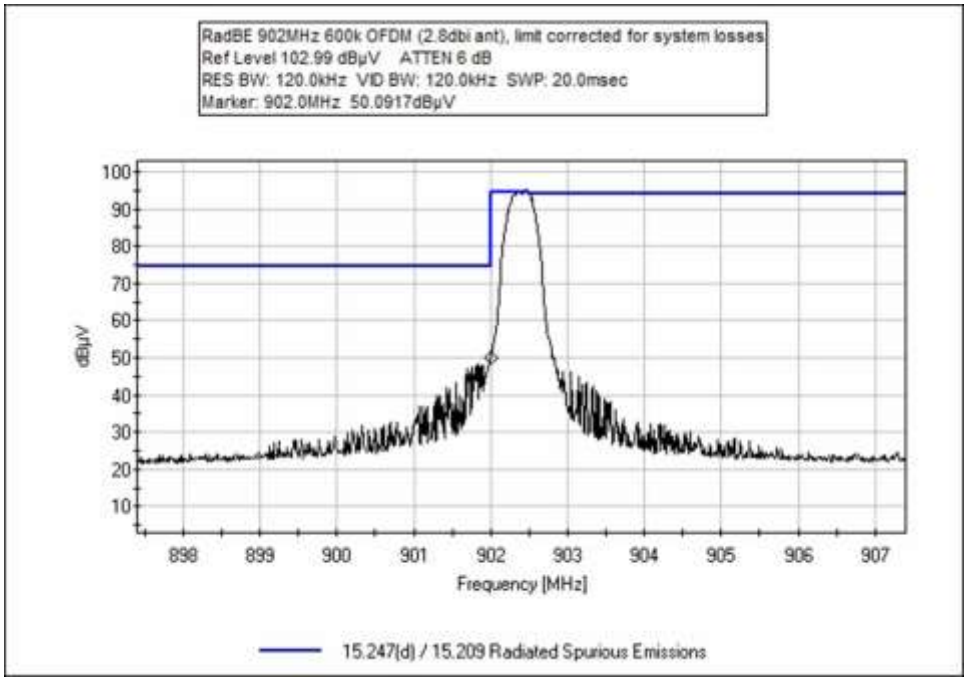

RadBE 614MHz 200k OFDM (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 41.905sec
Marker: 614.0MHz 14.3967dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
613.8
613.9
614.0
614.1
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

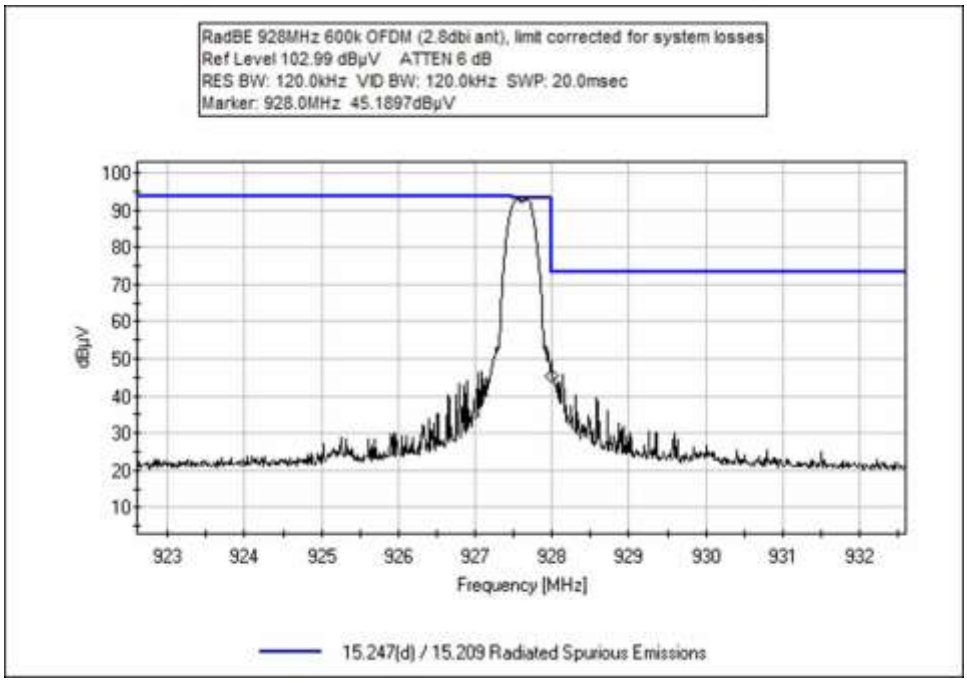

RadBE 902MHz 200k OFDM (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker 1: 901.94MHz 53.0557 dBµV Marker 2: 902.0MHz 48.0637 dBµV Delta: 60.0kHz
dBµV
100
90
80
70
60
50
40
30
20
10
898
899
900
901
902
903
904
905
906
907
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

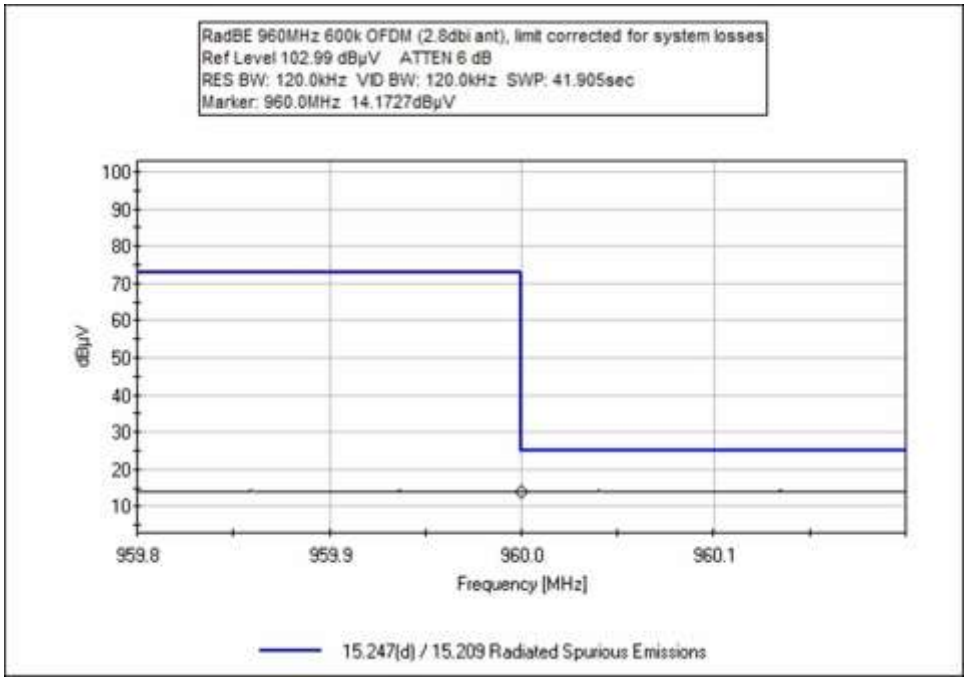

RadBE 928MHz 200k OFDM (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 1.445sec
Marker: 928.0MHz 53.6197dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

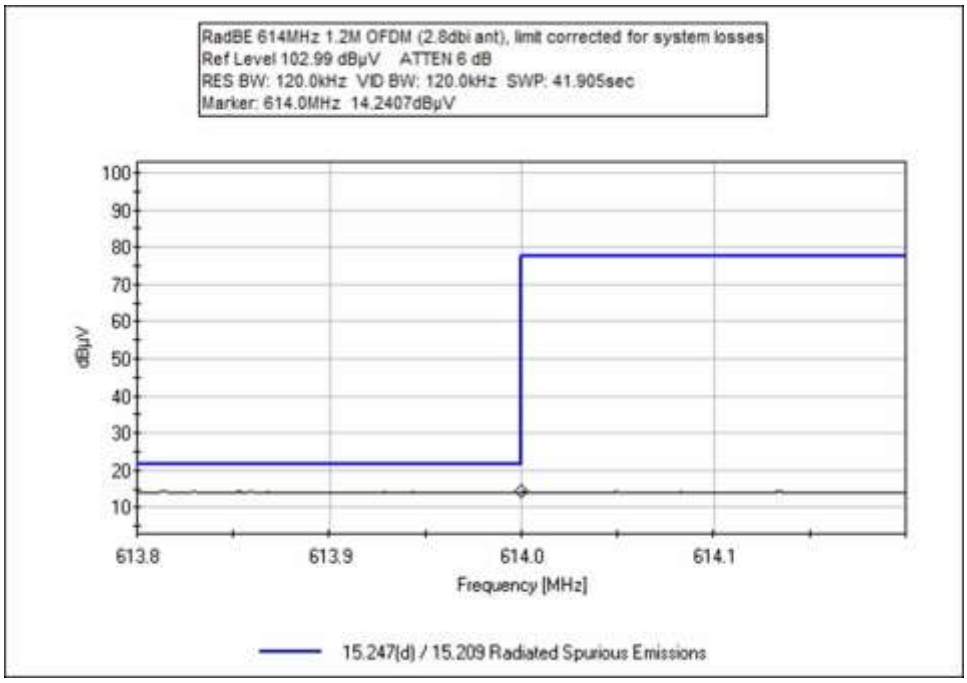

RadBE 960MHz 200k OFDM (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 41.905sec
Marker: 960.0MHz 14.3067dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

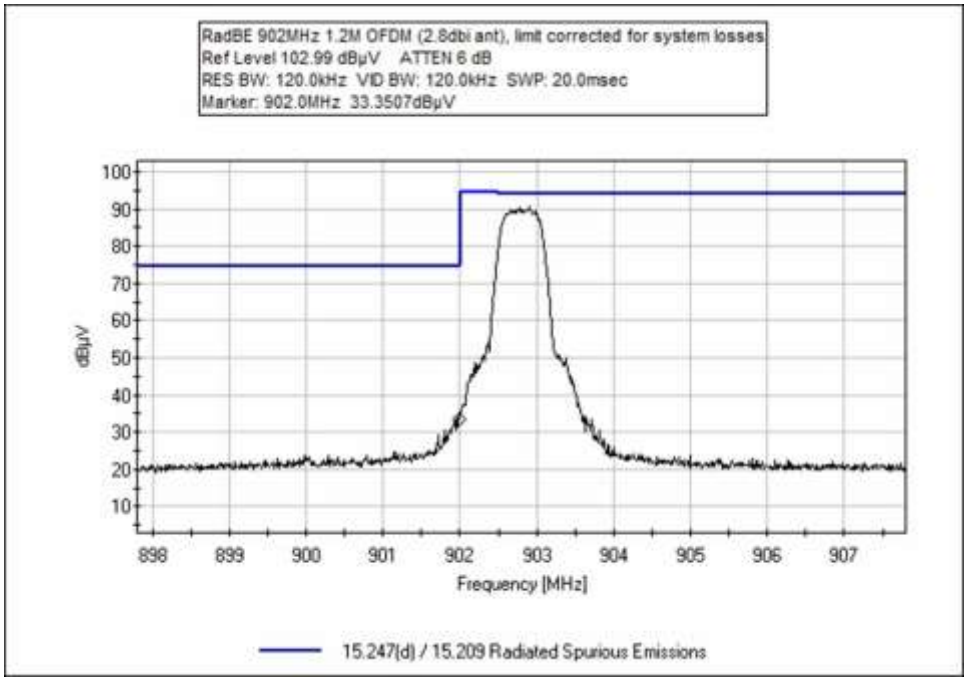

RadBE 614MHz 600k OFDM (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 41.905sec
Marker: 614.0MHz 14.1967dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
613.8
613.9
614.0
614.1
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

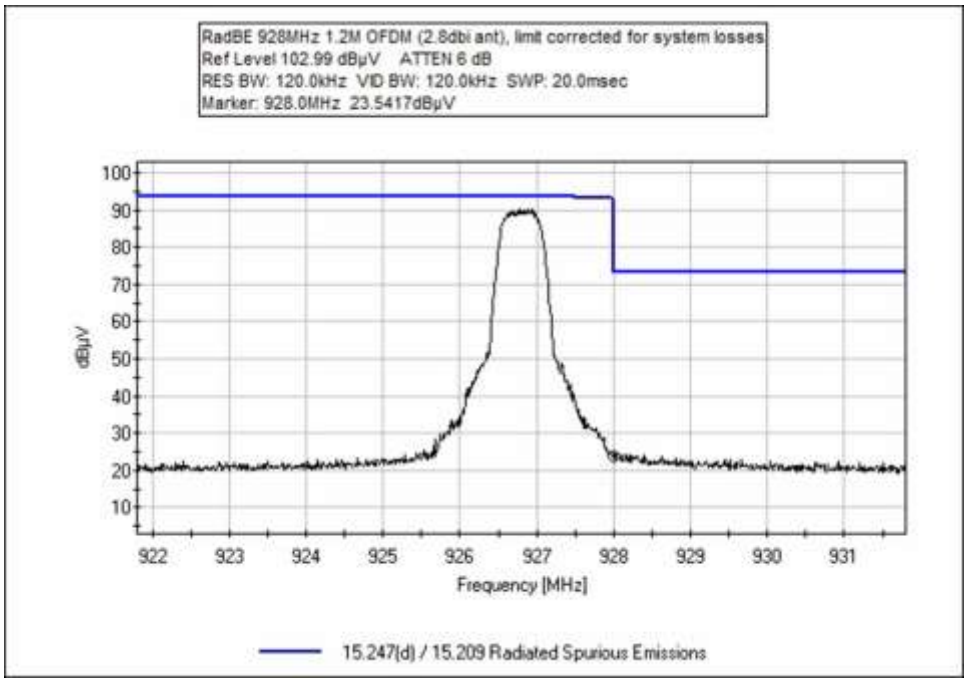

RadBE 902MHz 600k OFDM (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 902.0MHz 50.0917dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
898
899
900
901
902
903
904
905
906
907
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

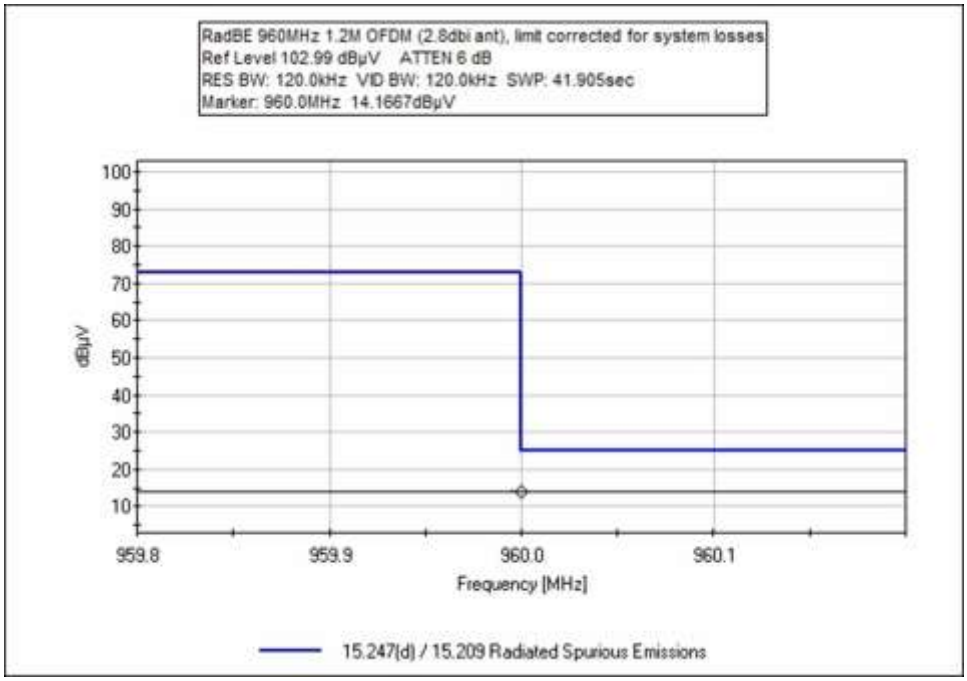

RadBE 928MHz 600k OFDM (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 928.0MHz 45.1897dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


RadBE 960MHz 600k OFDM (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 41.905sec
Marker: 960.0MHz 14.1727dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

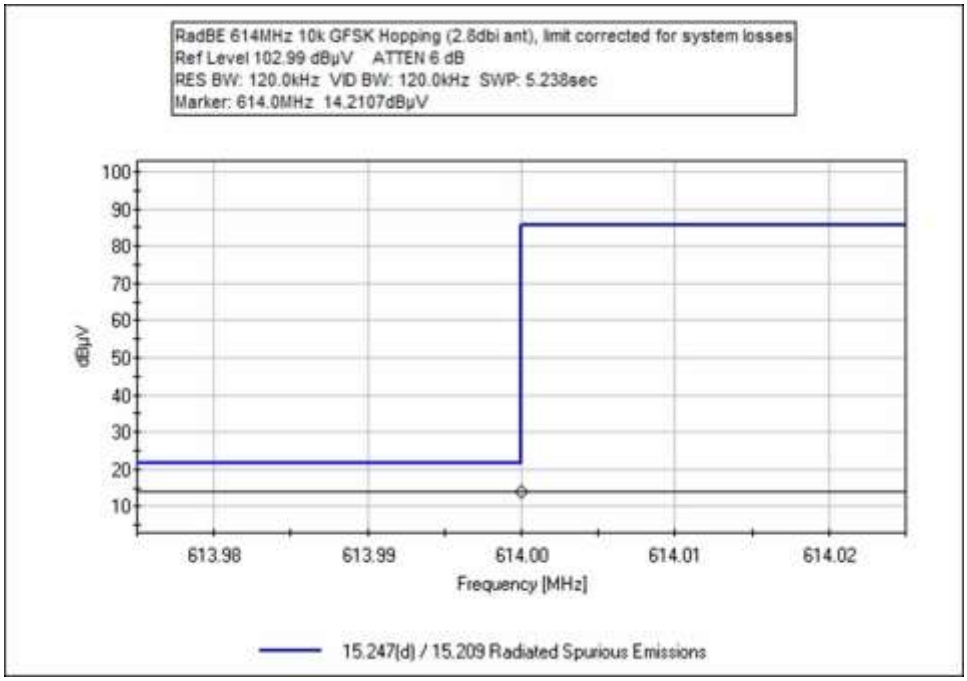

RadBE 614MHz 1.2M OFDM (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 41.905sec
Marker: 614.0MHz 14.2407dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
613.8
613.9
614.0
614.1
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

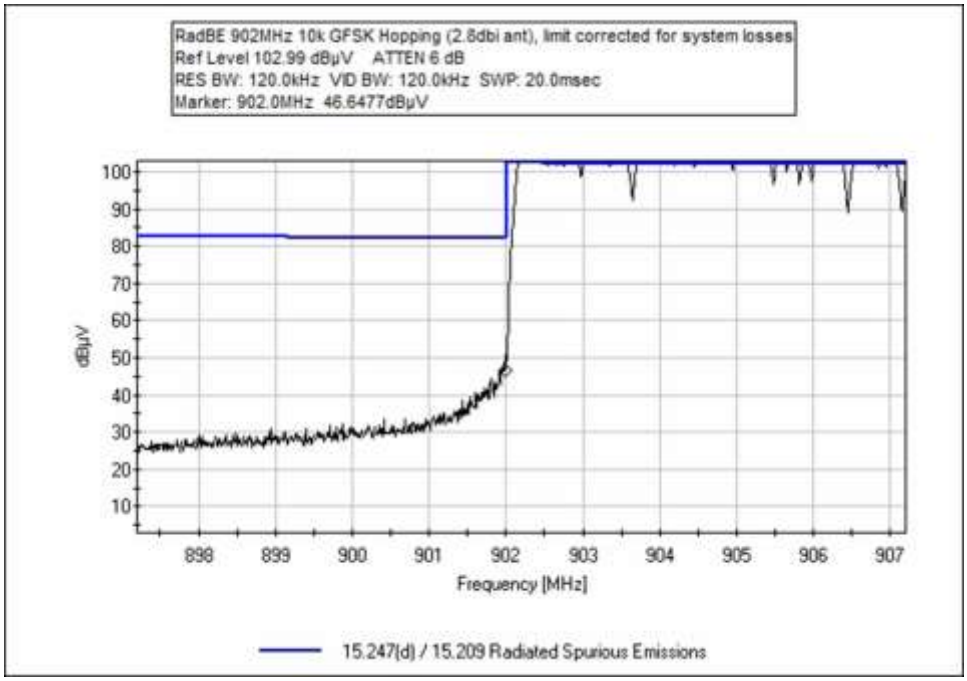

RadBE 902MHz 1.2M OFDM (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 902.0MHz 33.3507dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
898
899
900
901
902
903
904
905
906
907
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

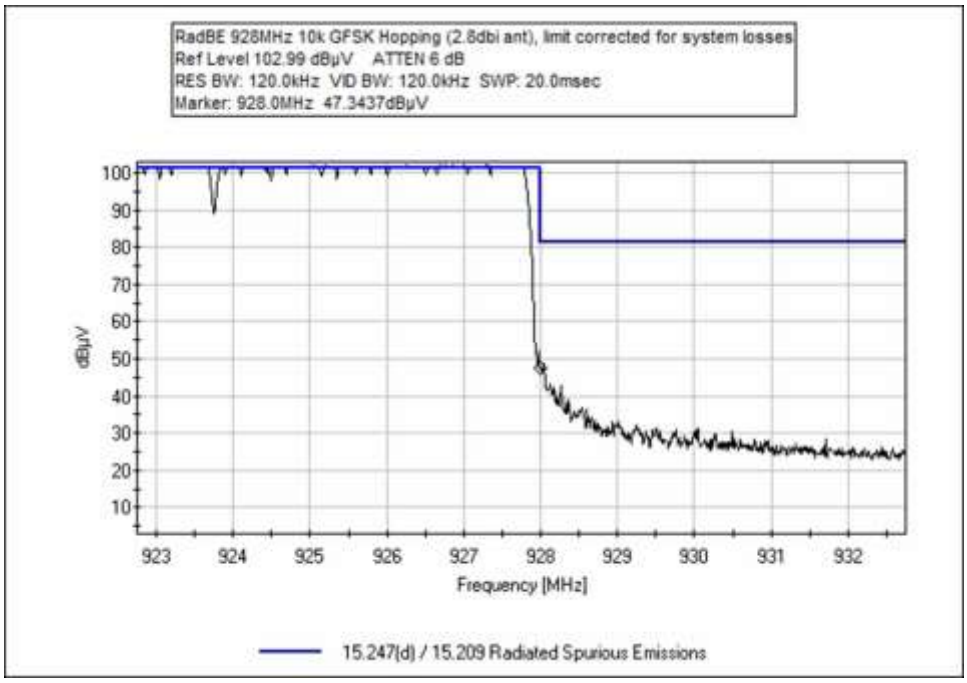

RadBE 928MHz 1.2M OFDM (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 928.0MHz 23.5417dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

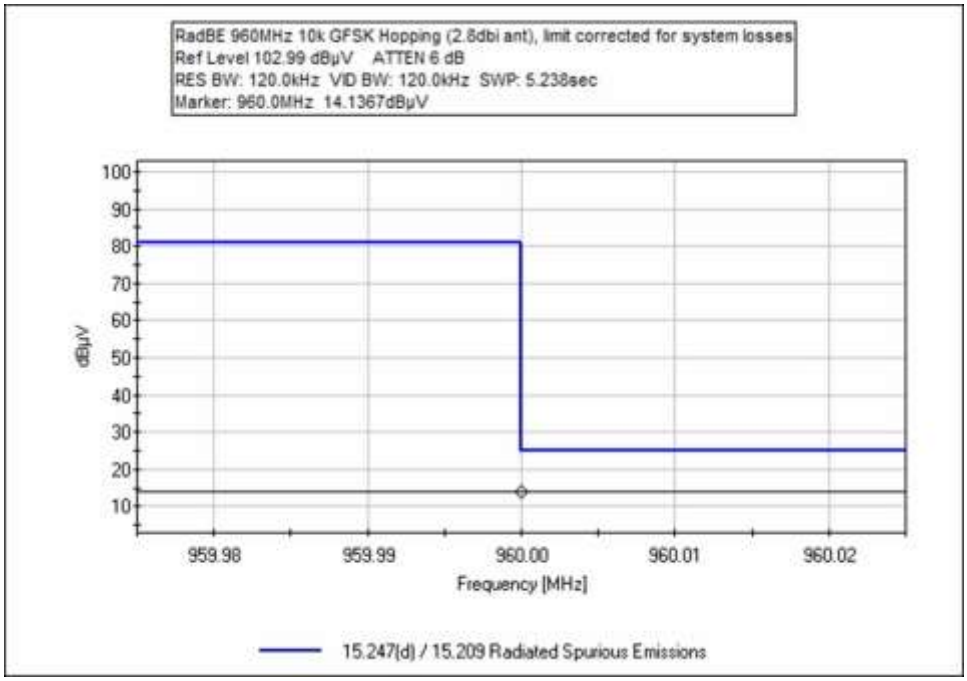

RadBE 960MHz 1.2M OFDM (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 41.905sec
Marker: 960.0MHz 14.1667dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

GFSK Hopping

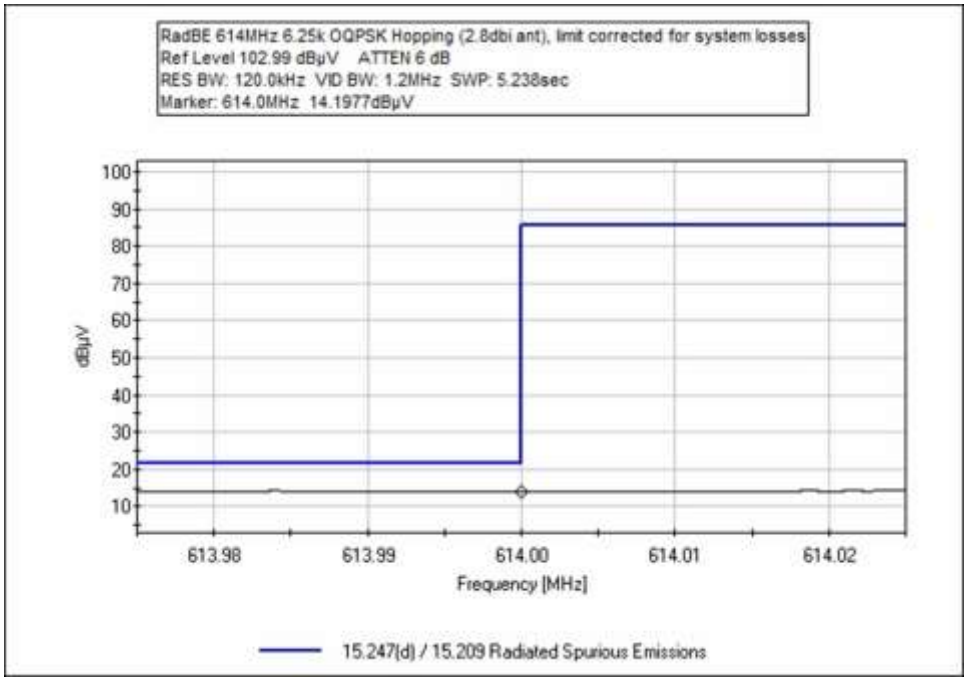


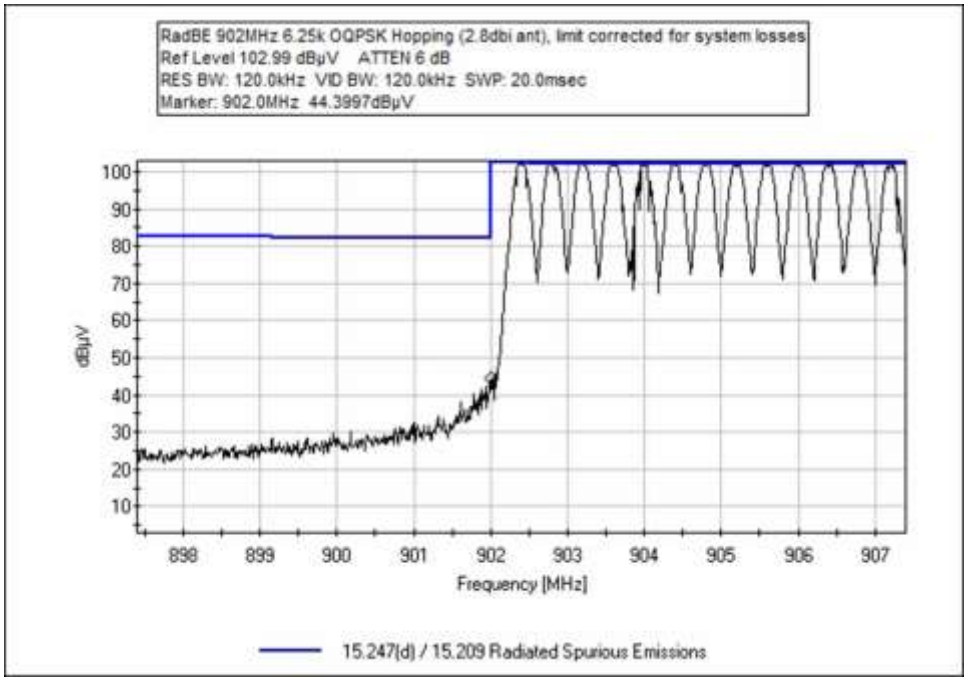


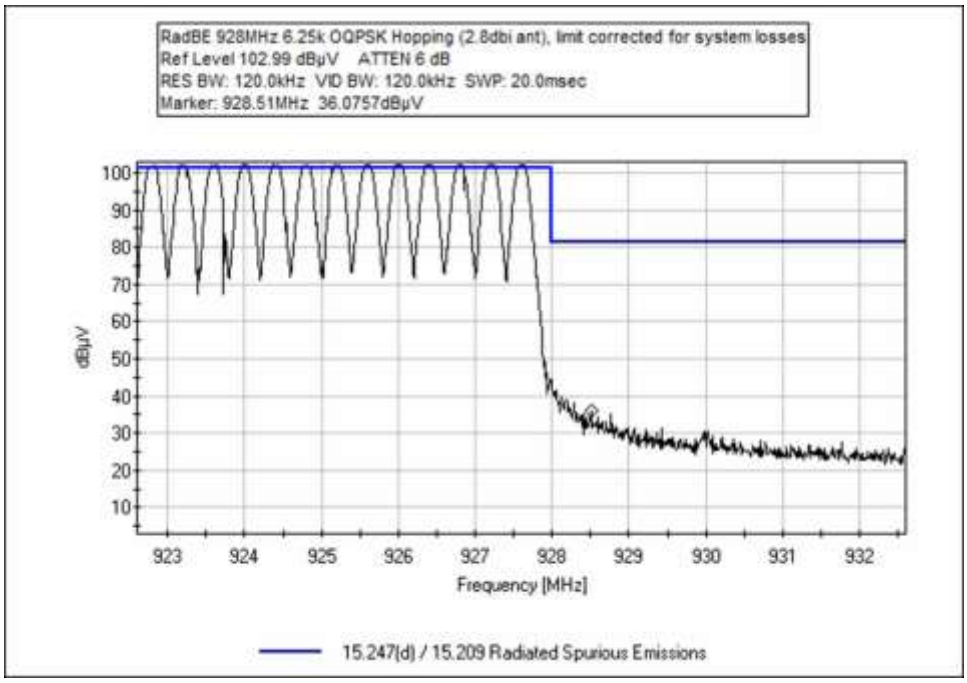

RadBE 928MHz 10k GFSK Hopping (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 928.0MHz 47.3437dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
923
924
925
926
927
928
929
930
931
932
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

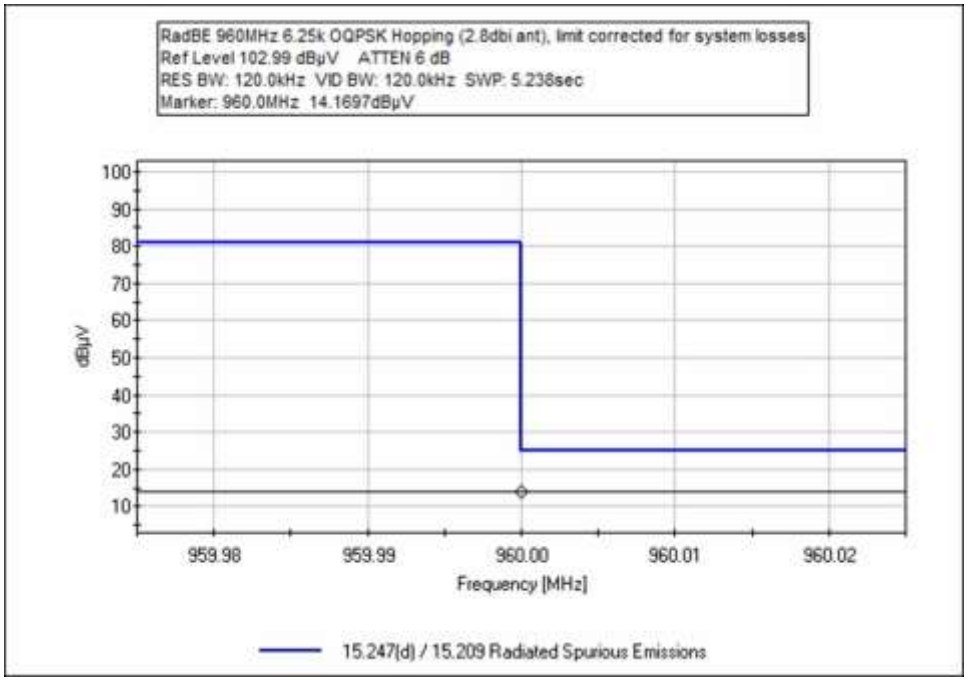

RadBE 960MHz 10k GFSK Hopping (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 5.238sec
Marker: 960.0MHz 14.1367dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
959.98
959.99
960.00
960.01
960.02
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

OQPSK Hopping

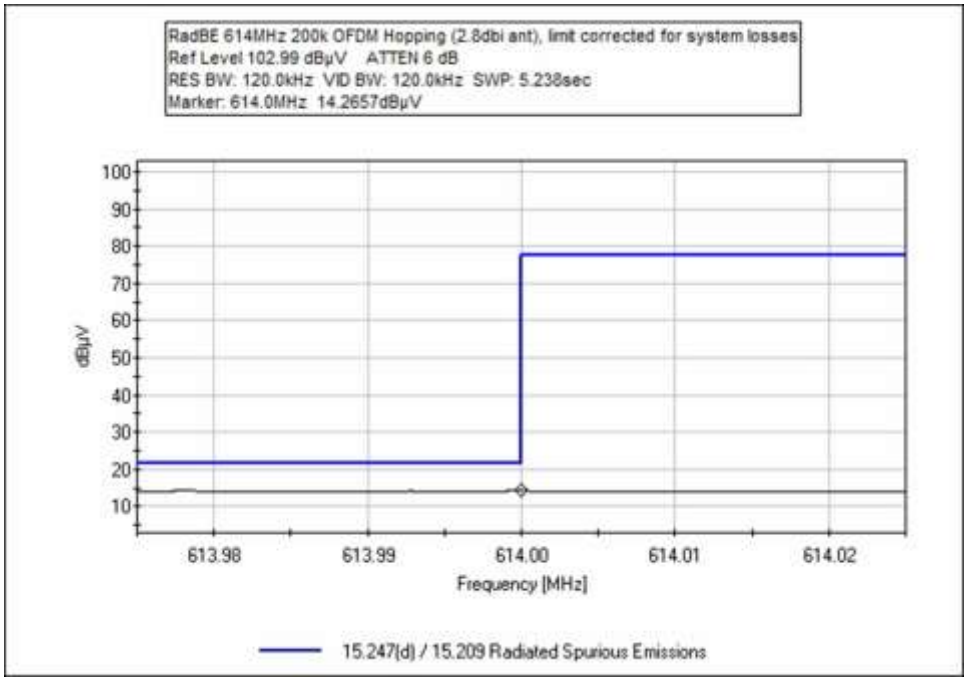


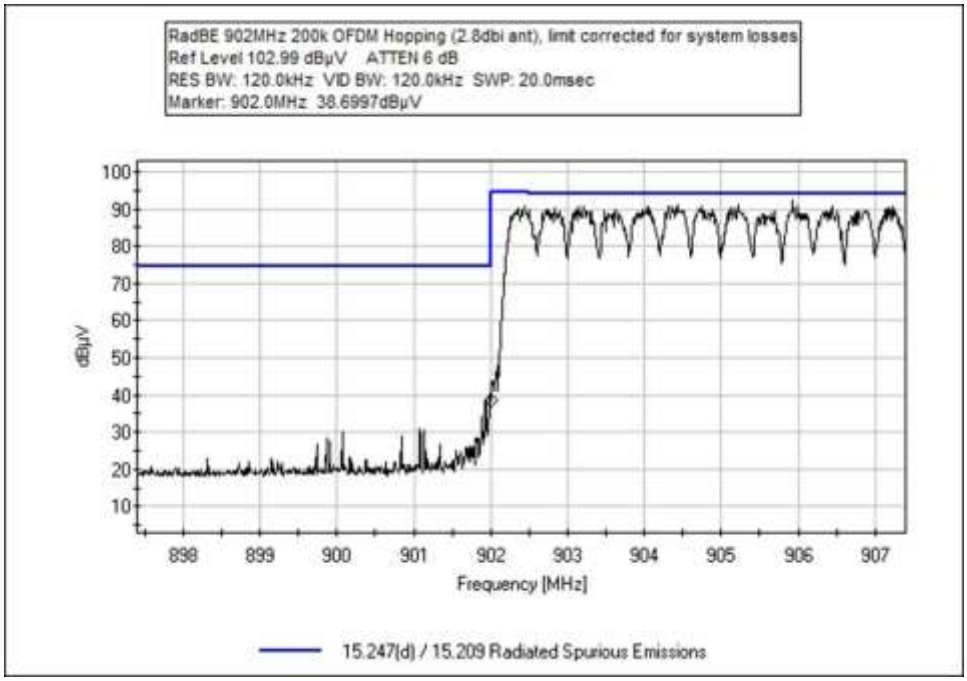


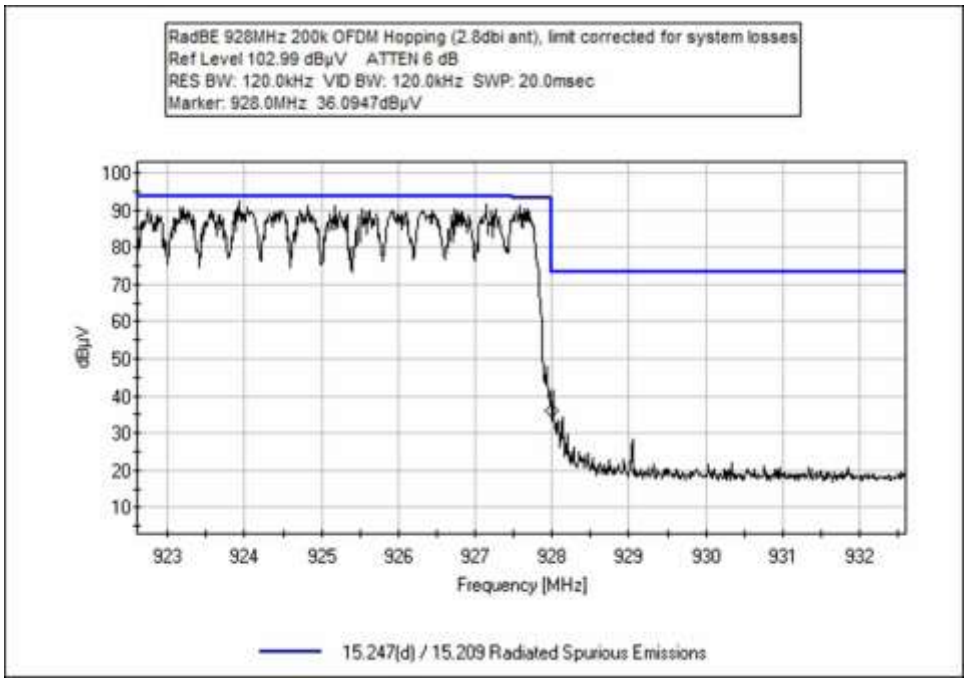

RadBE 928MHz 6.25k OQPSK Hopping (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 928.51MHz 36.0757dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

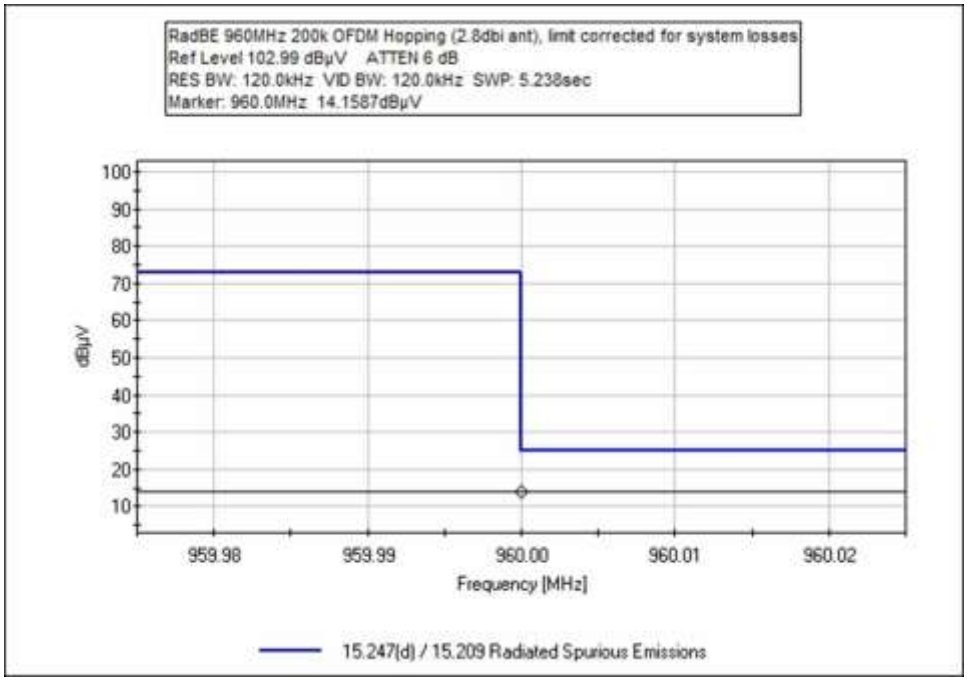

RadBE 960MHz 6.25k OQPSK Hopping (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 5.238sec
Marker: 960.0MHz 14.1697dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

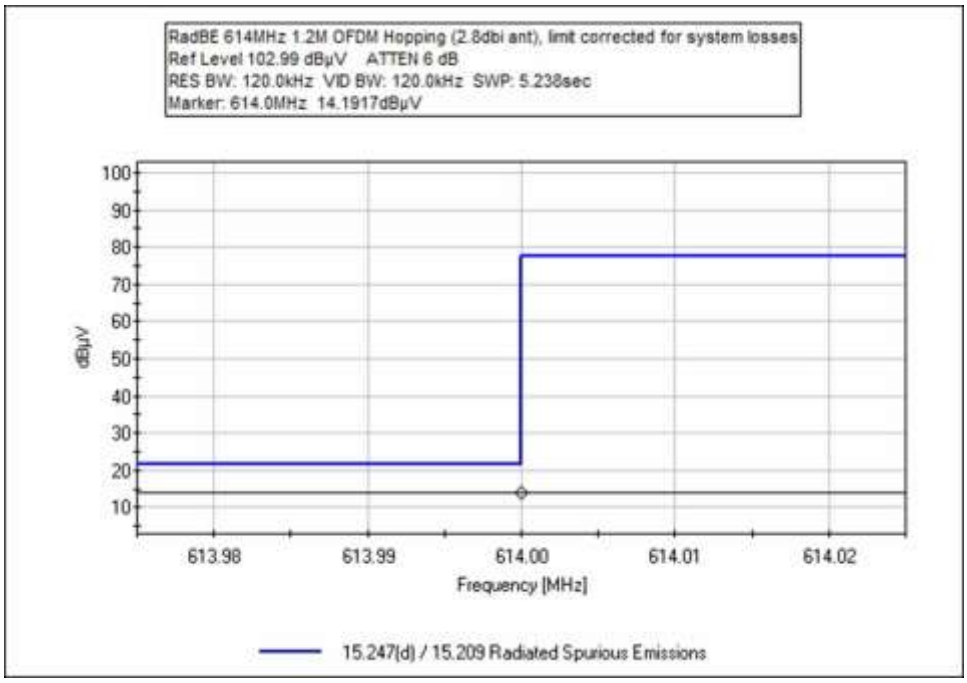
OFDM Hopping

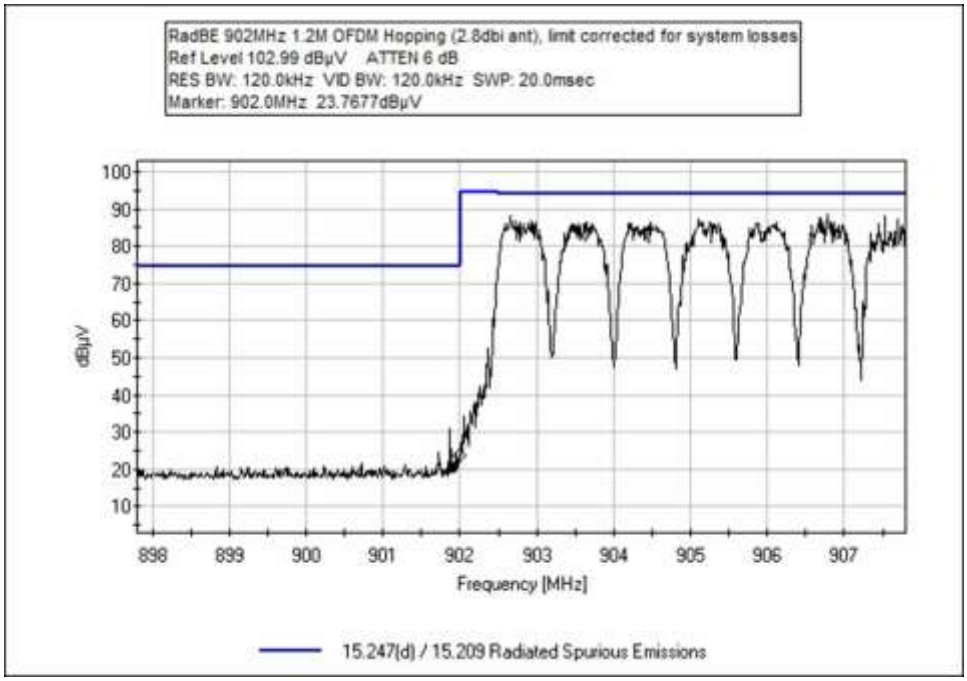


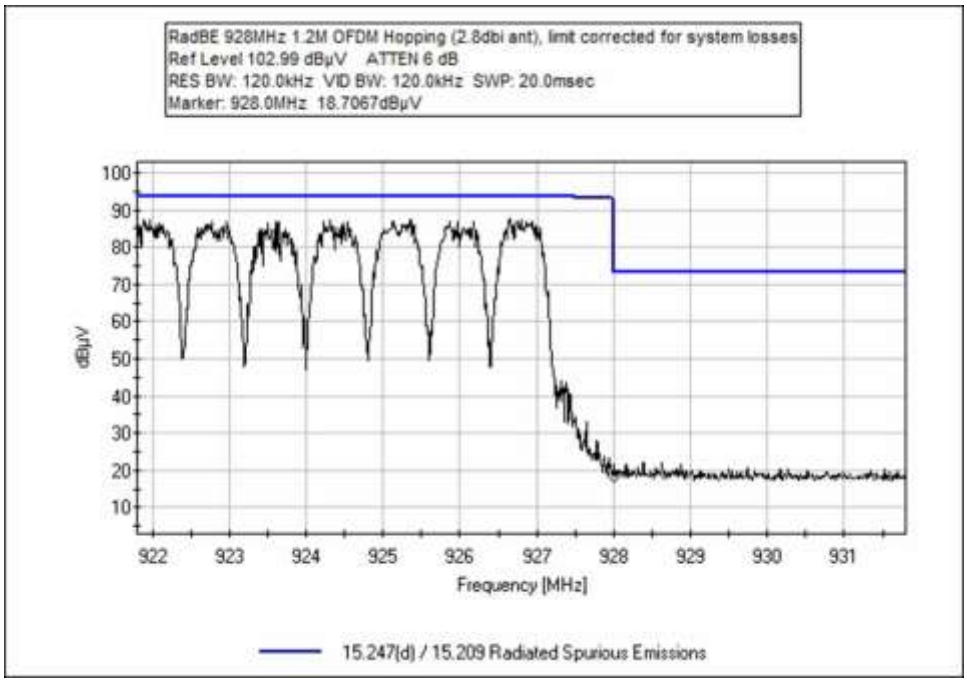


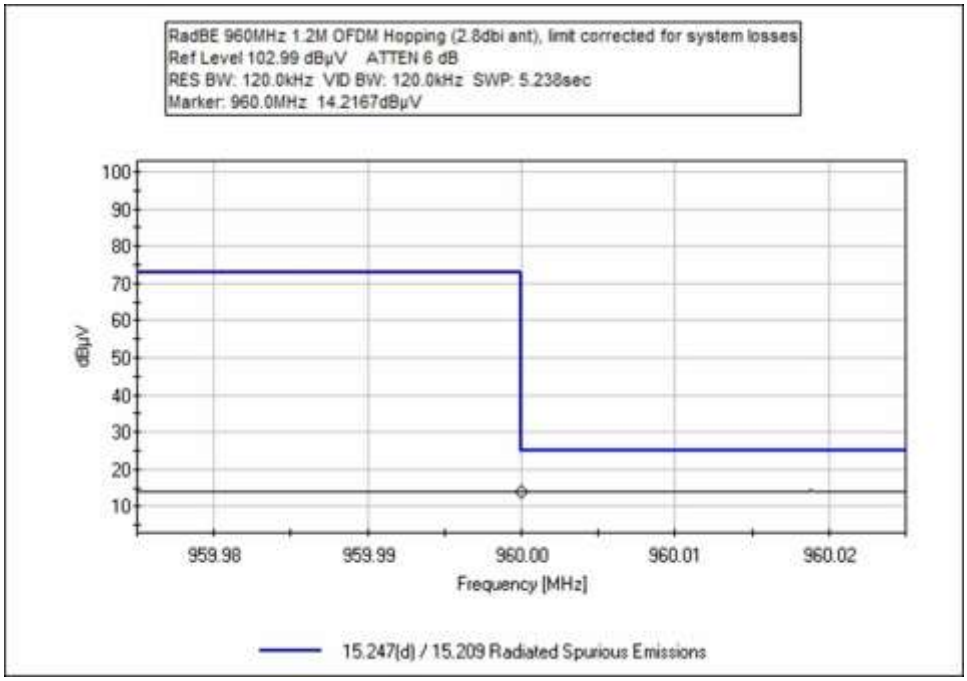

RadBE 928MHz 200k OFDM Hopping (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 928.0MHz 36.0947dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


RadBE 960MHz 200k OFDM Hopping (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 5.238sec
Marker: 960.0MHz 14.1587dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


RadBE 614MHz 1.2M OFDM Hopping (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 5.238sec
Marker: 614.0MHz 14.1917dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
613.98
613.99
614.00
614.01
614.02
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

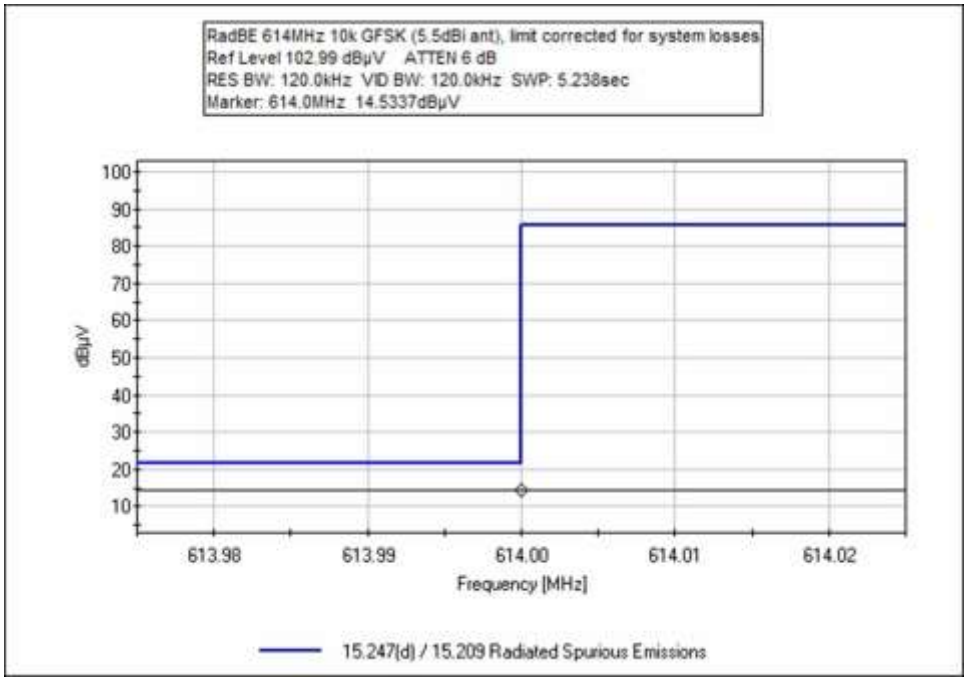

RadBE 902MHz 1.2M OFDM Hopping (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 902.0MHz 23.7677dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
898
899
900
901
902
903
904
905
906
907
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

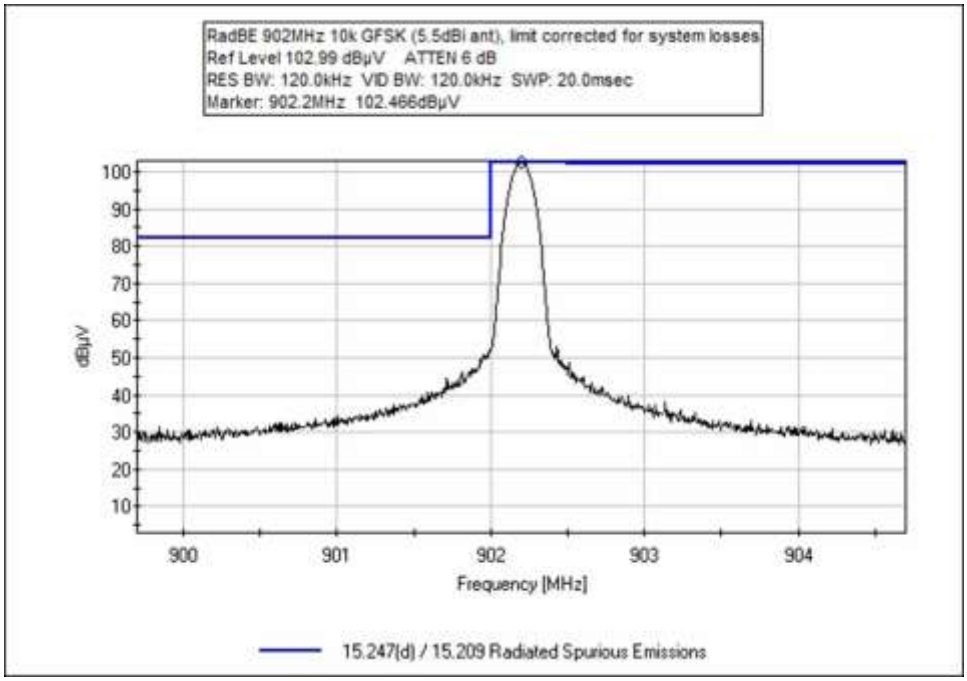

RadBE 928MHz 1.2M OFDM Hopping (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 928.0MHz 18.7067dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
922
923
924
925
926
927
928
929
930
931
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

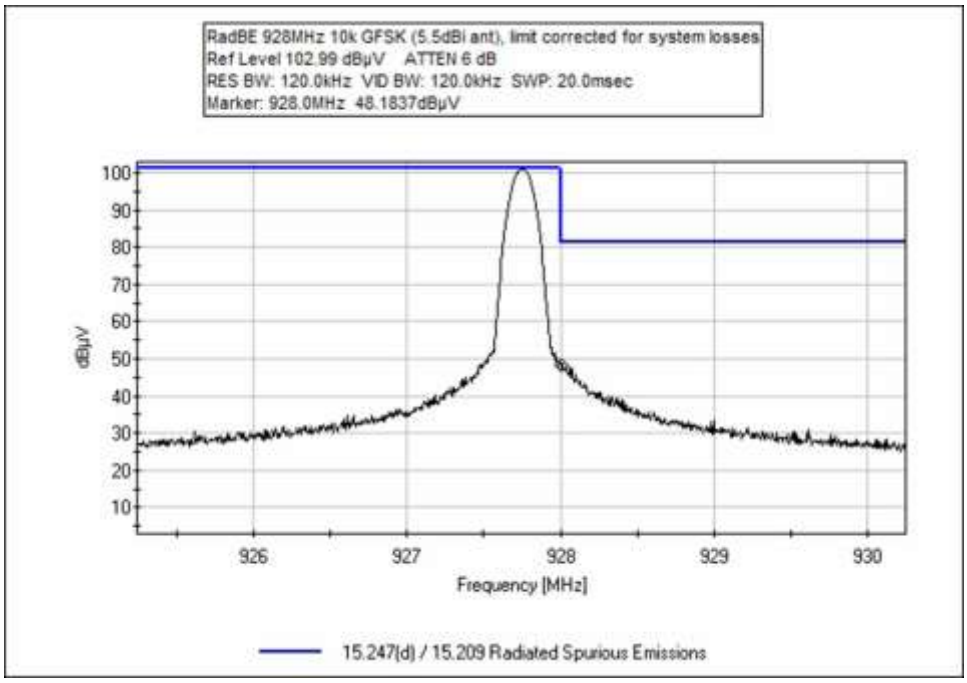

RadBE 960MHz 1.2M OFDM Hopping (2.8dbi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 5.238sec
Marker: 960.0MHz 14.2167dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
959.98
959.99
960.00
960.01
960.02
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

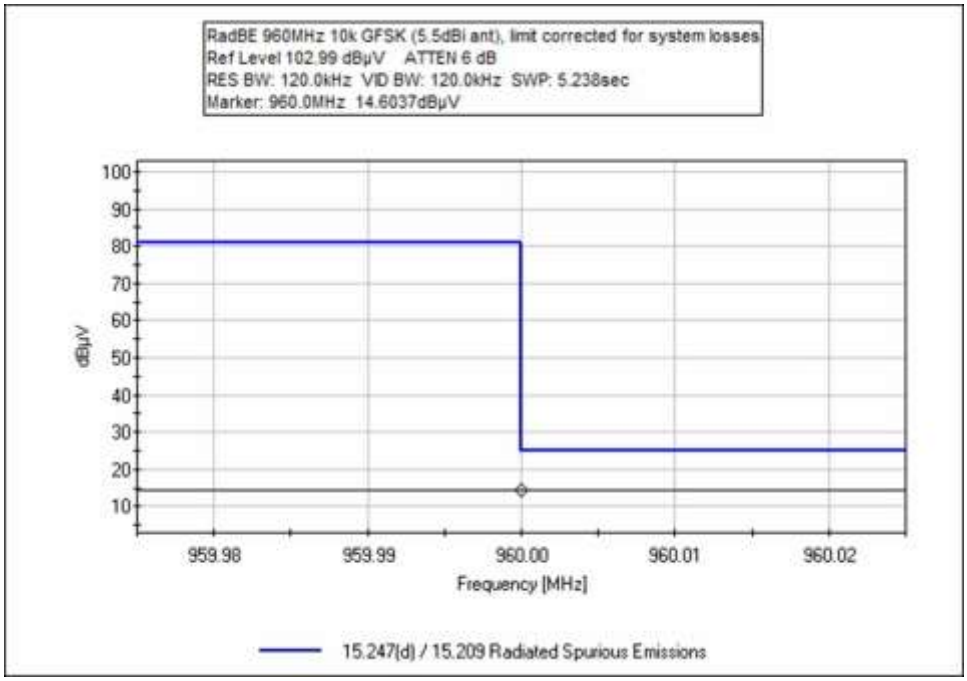
Configuration 3

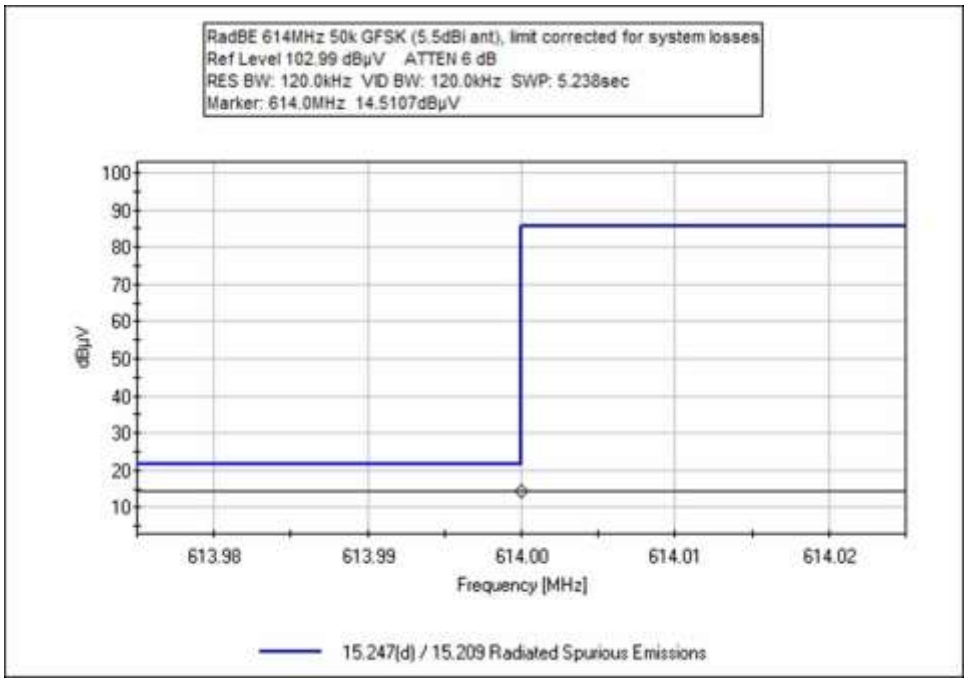
GFSK

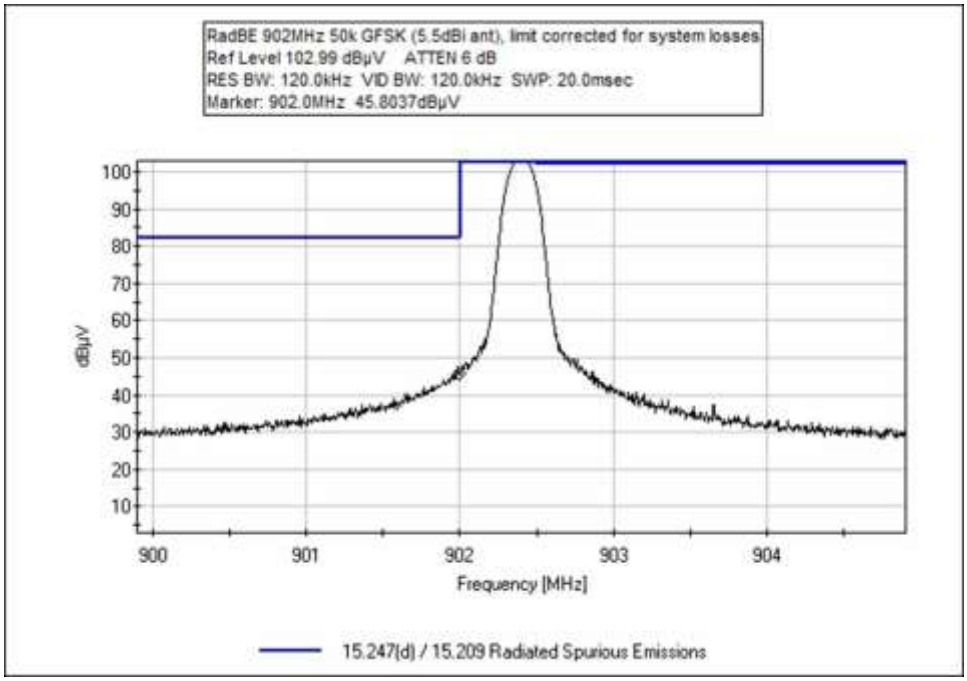


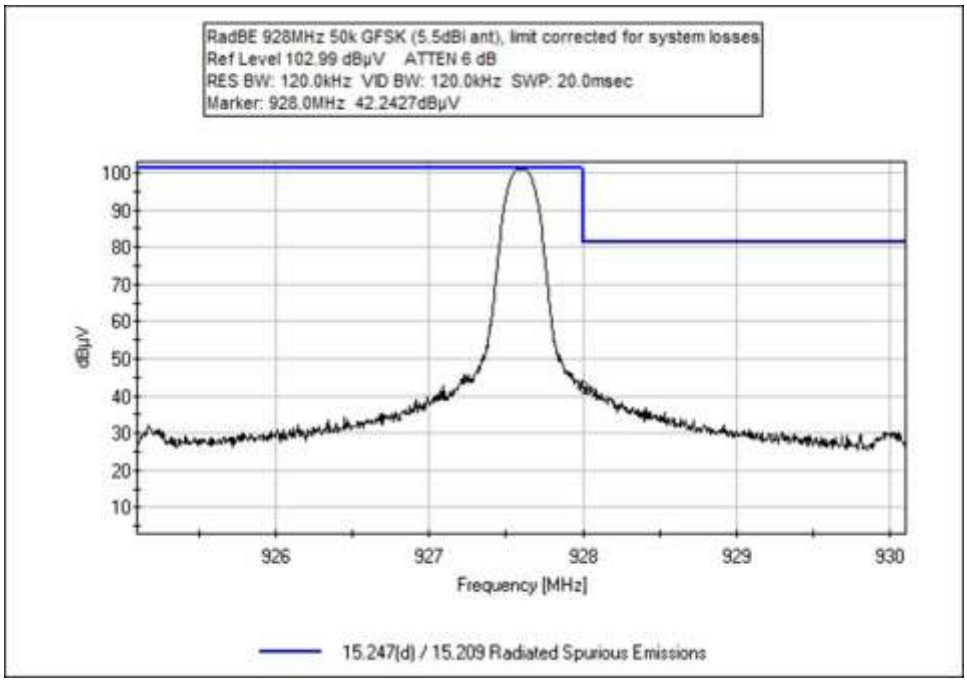


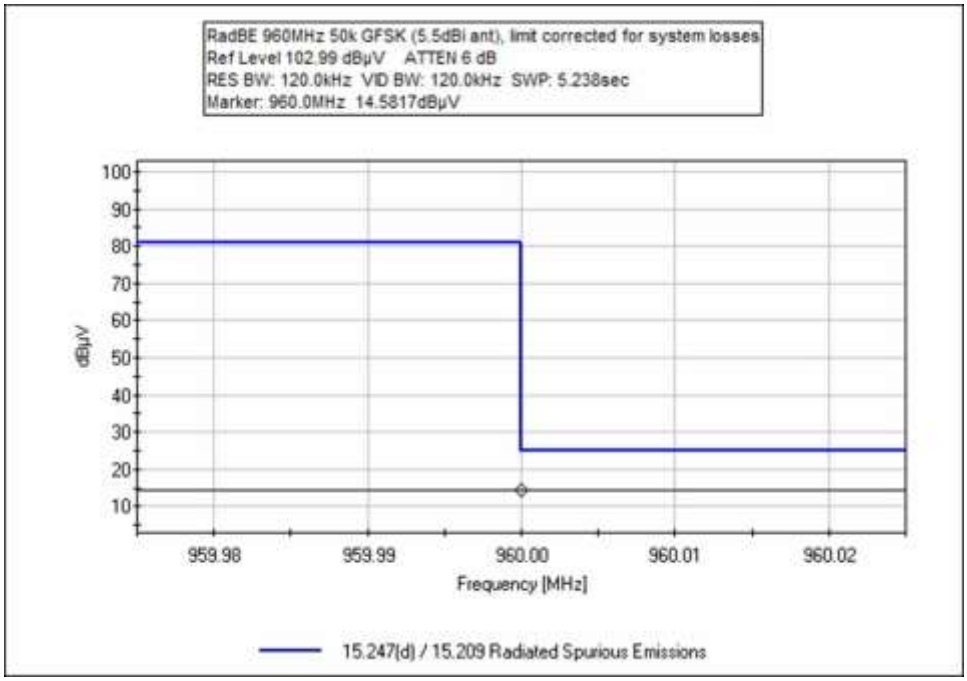

RadBE 928MHz 10k GFSK (5.5dBi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 928.0MHz 48.1837dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

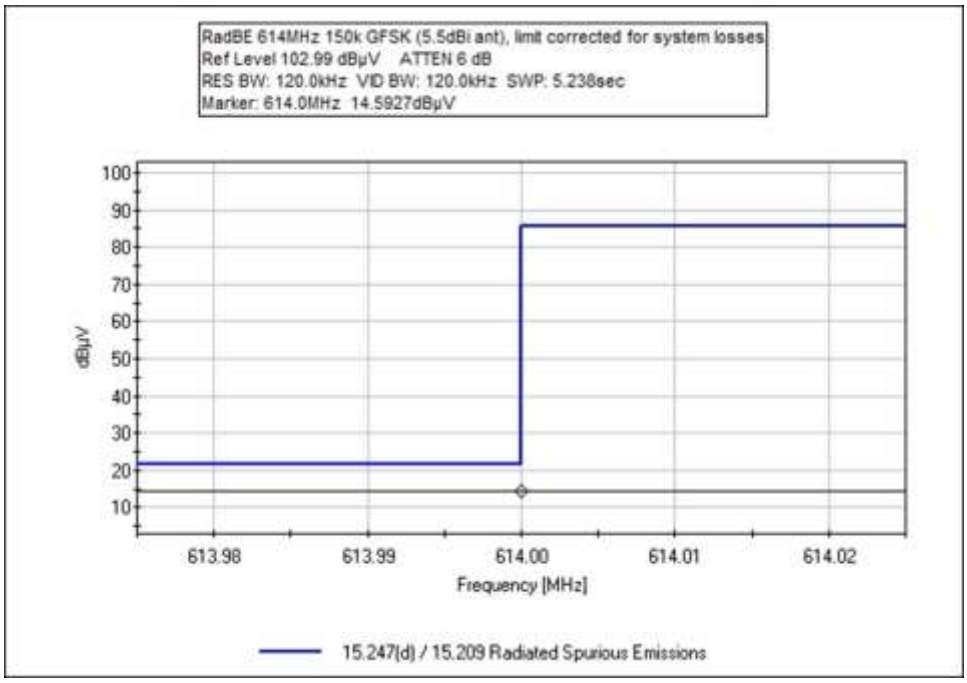

RadBE 960MHz 10k GFSK (5.5dBi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 5.238sec
Marker: 960.0MHz 14.6037dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

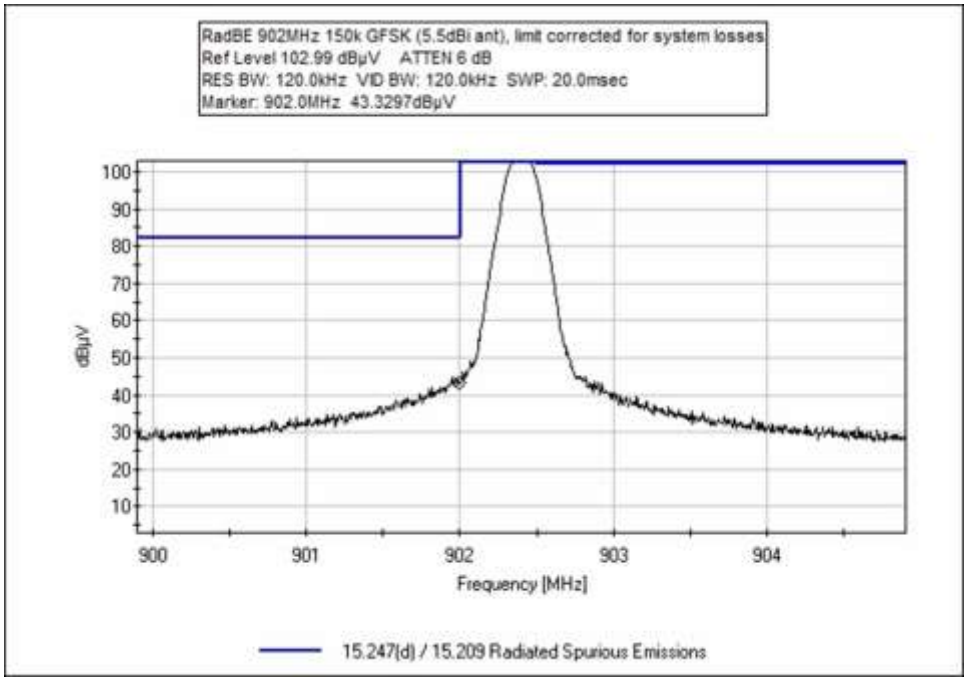

RadBE 614MHz 50k GFSK (5.5dBi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 5.238sec
Marker: 614.0MHz 14.5107dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
613.98
613.99
614.00
614.01
614.02
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

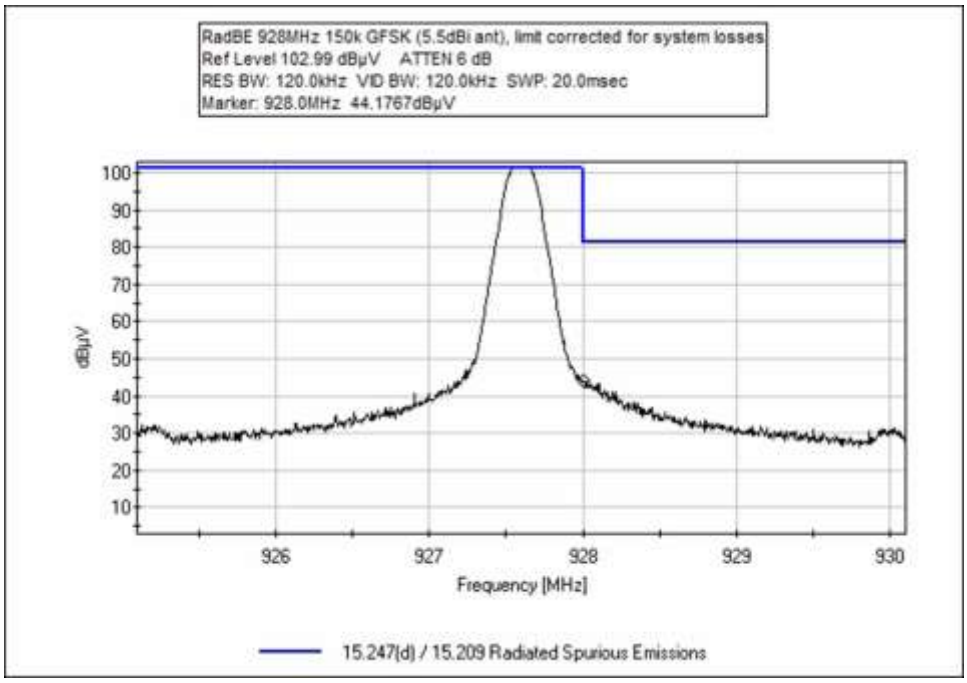

RadBE 902MHz 50k GFSK (5.5dBi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 902.0MHz 45.8037dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
900
901
902
903
904
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

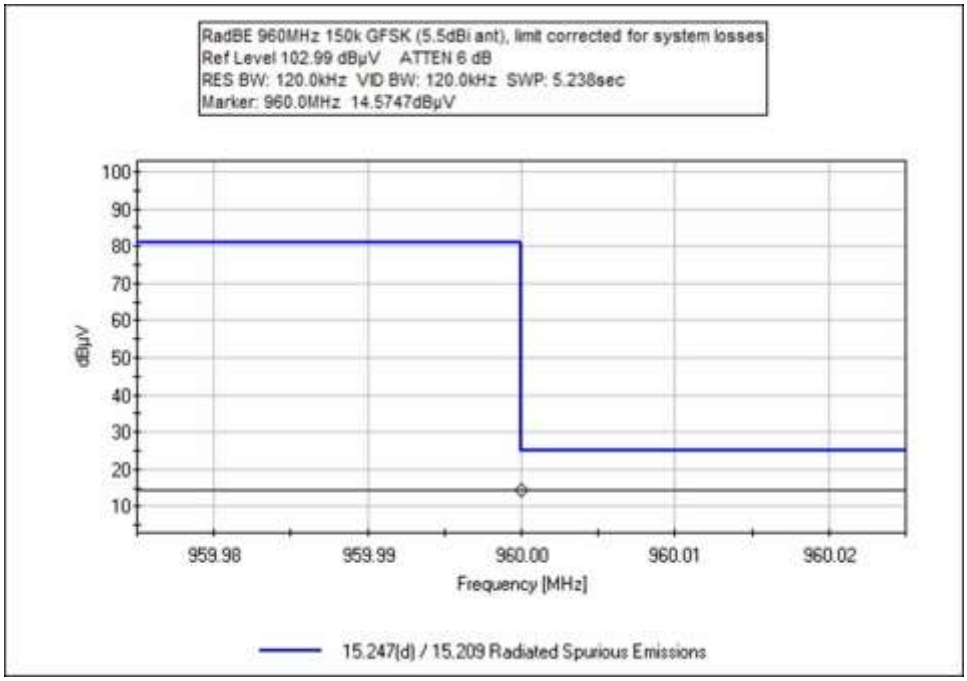

RadBE 928MHz 50k GFSK (5.5dBi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 928.0MHz 42.2427dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


RadBE 960MHz 50k GFSK (5.5dBi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 5.238sec
Marker: 960.0MHz 14.5817dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

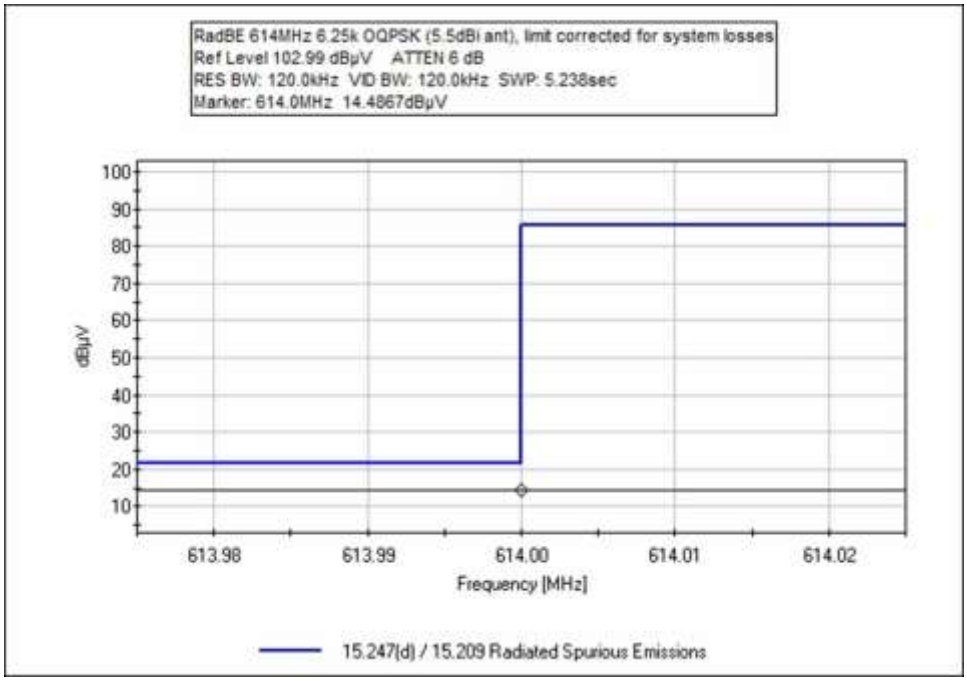

RadBE 614MHz 150k GFSK (5.5dBi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 5.238sec
Marker: 614.0MHz 14.5927dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
613.98
613.99
614.00
614.01
614.02
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

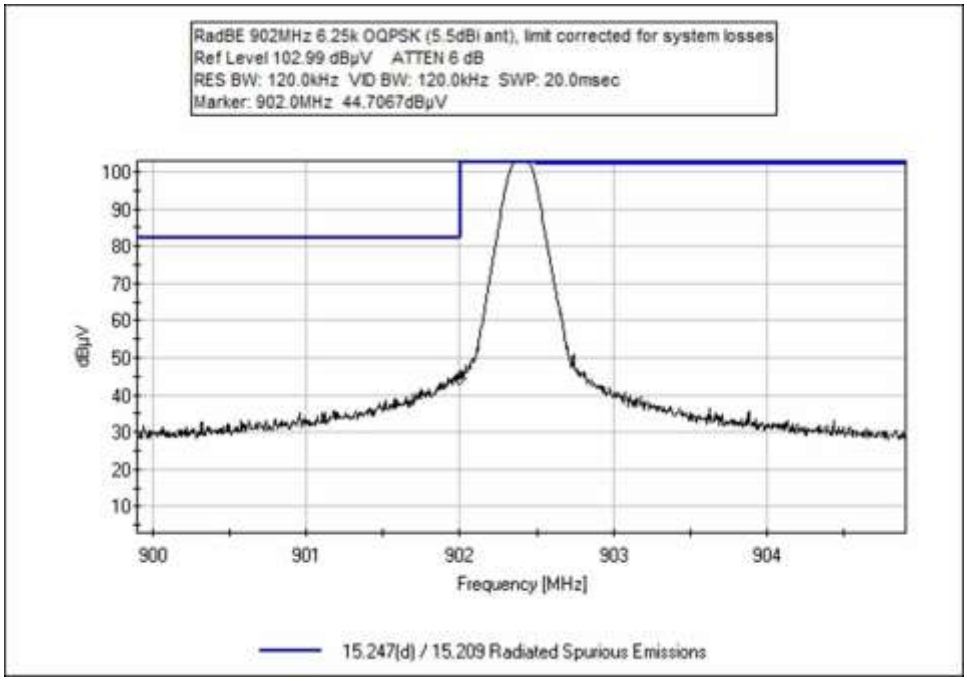

RadBE 902MHz 150k GFSK (5.5dBi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 902.0MHz 43.3297dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
900
901
902
903
904
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

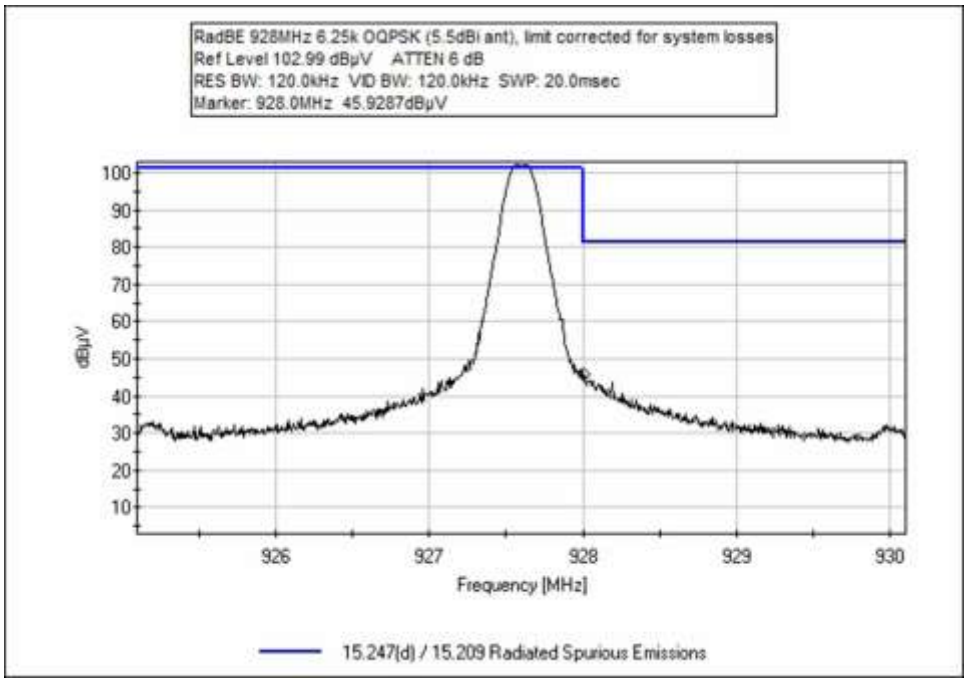

RadBE 928MHz 150k GFSK (5.5dBi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 928.0MHz 44.1767dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
926
927
928
929
930
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

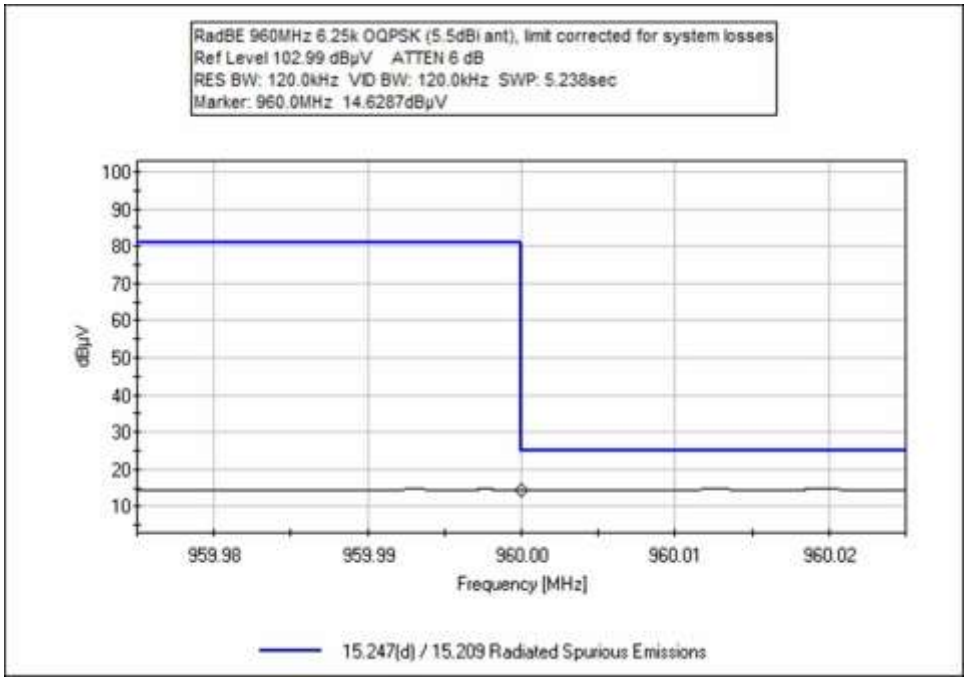

RadBE 960MHz 150k GFSK (5.5dBi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 5.238sec
Marker: 960.0MHz 14.5747dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
959.98
959.99
960.00
960.01
960.02
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

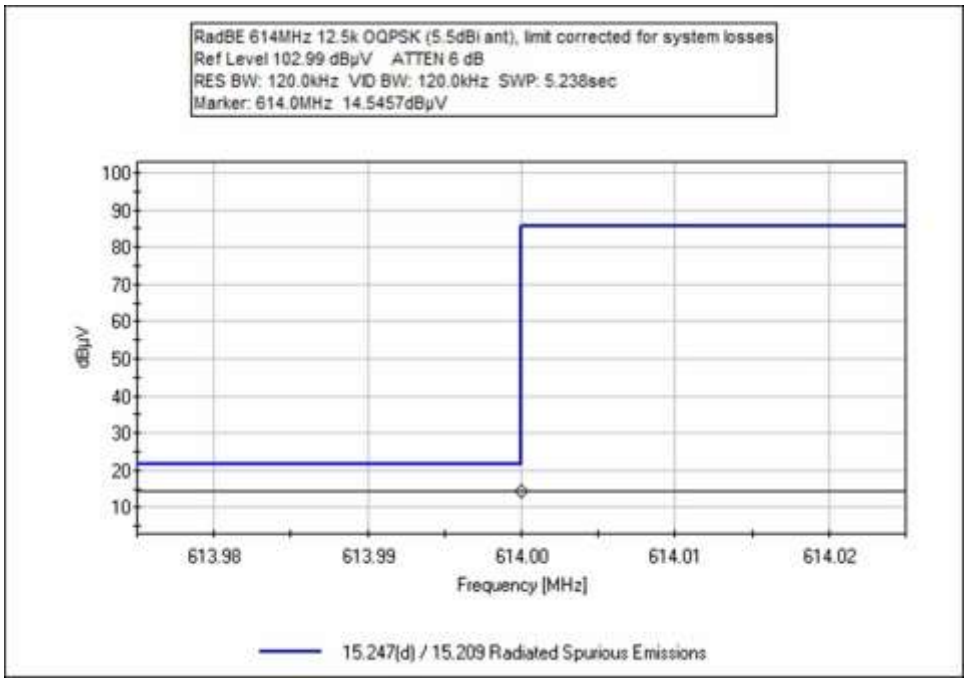
OQPSK

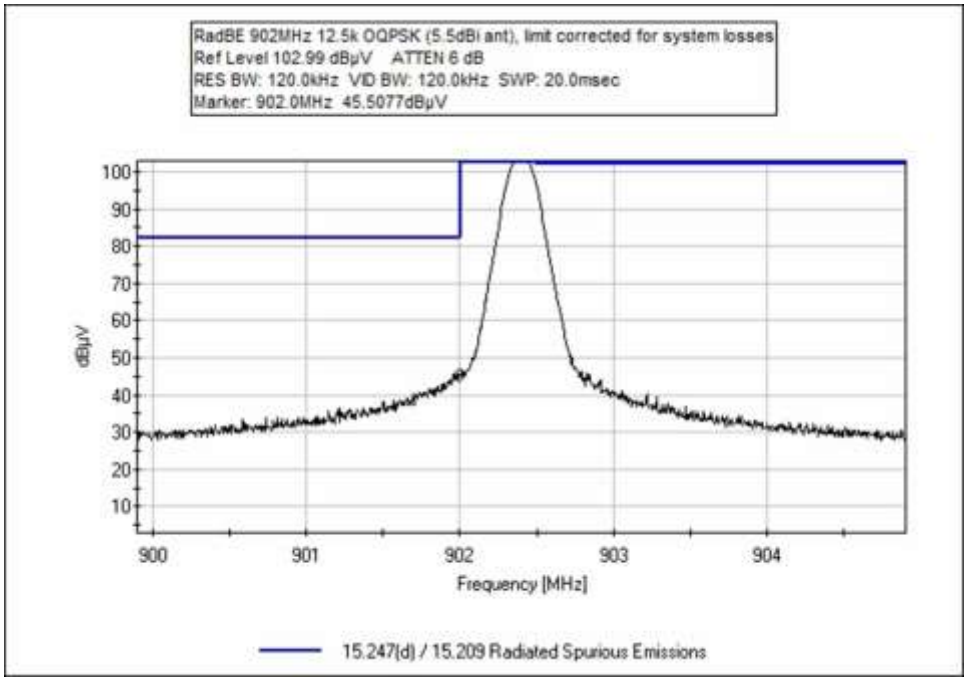

RadBE 614MHz 6.25k OQPSK (5.5dBi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 5.238sec
Marker: 614.0MHz 14.4867dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
613.98
613.99
614.00
614.01
614.02
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


RadBE 902MHz 6.25k OQPSK (5.5dBi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 902.0MHz 44.7067dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
900
901
902
903
904
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


RadBE 928MHz 6.25k OQPSK (5.5dBi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 928.0MHz 45.9287dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
926
927
928
929
930
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


RadBE 960MHz 6.25k OQPSK (5.5dBi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 5.238sec
Marker: 960.0MHz 14.6287dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
959.98
959.99
960.00
960.01
960.02
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


RadBE 614MHz 12.5k OQPSK (5.5dBi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 5.238sec
Marker: 614.0MHz 14.5457dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
613.98
613.99
614.00
614.01
614.02
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


RadBE 902MHz 12.5k OQPSK (5.5dBi ant), limit corrected for system losses
Ref Level 102.99 dBµV ATTEN 6 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
Marker: 902.0MHz 45.5077dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
900
901
902
903
904
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions